pp. 167–254] [March, 1938

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Main Contents :

RABIES.
LEISHMANIASIS.
MALARIA.
PLAGUE.
HELMINTHIASIS.
MEDICAL AND SANITARY REPORTS.

For detailed Contents see pp. ii, iv & vi.

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BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

Vol. 35.] 1938. [No. 3.

RABIES.

A REVIEW OF RECENT ARTICLES.—XXVIII.*

Further reports have been received regarding rabies in Trinidad[1]. In 1936 there were only 4 human cases of acute ascending transverse myelitis as compared with 21 in the previous year. An extensive scheme for the destruction of *Desmodus* bats has been in operation throughout the year. Many were destroyed, and a corresponding fall has occurred in the numbers of animals bitten. Of 3,623 *Desmodus* captured 99, or 2·7 per cent., contained Negri bodies. In addition 1,661 fruit and insect eating bats were examined and in two only were Negri bodies found. The discovery by CLARK and DUNN [I can find no trace of this] that blood-lapping bats are capable of surviving for long periods on defibrinated blood rendered it possible to examine under artificial conditions the progress of rabies in these wild nocturnal animals. Human, animal, and bat strains were inoculated into vampires, and it was found that the incubation period varied from 9 to 150 days ; that the disease assumed forms varying from fury to paralysis ; and that the furious form may end in recovery.

The epidemiology of rabies in the island of Cuba during the last 10 years is discussed by ARENAS MARTORELL and HERRADA LLIBRE.[2] Human deaths declined from 9 cases in 1927 to zero, whilst the number of animal cases has diminished from 144 to 20.

A recapitulation of THOMAS and MENTZ's[3] observations on rabies in South Africa, with special reference to the genet and the mongoose as carriers of the disease, is published in popular form.

* For the twenty-seventh of this series see this *Bulletin*, 1937, Vol. 34, p. 671.

[1] TRINIDAD AND TOBAGO. ANNUAL MEDICAL AND SANITARY REPORT FOR THE YEAR ENDED ON THE 31ST DECEMBER, 1936 [RANKINE (A.), Director of Medical Services].—[Rabies pp. 52–54.]

[2] ARENAS MARTORELL (Rogelio) & HERRADA LLIBRE (Manuel). Estudio epidemiologico de la rabia en los ultimos 10 años.—*Rev. Med. Trop. y Parasit.* Habana. 1937. May–June. Vol. 3. No. 3. pp. 193–206.

[3] THOMAS (A. D.) & MENTZ (W. O.). Wild Carnivora as Carriers of Rabies.—*Public Health*. Johannesburg. 1937. Apr. Vol. 2. No. 3. pp. 16–17, 19–21, 23–5, 32.

i. *Virus.*

Further details regarding their successful propagation of the virus of rabies in tissue culture are furnished by WEBSTER and CLOW[4] (see also this *Bulletin*, 1937, Vol. 34, p. 671). The medium is a serum Tyrode solution containing either embryo mouse brain or embryo chick brain. "The culture virus reached a titre of 3×10^{-5} cc. after 4 days incubation at 37°C., and survived at least 2 months at 5°C. in the liquid or dry state." Mouse brain virus has been propagated through 42 passages, and throughout the series subinoculations in various dilutions have been made intracerebrally into mice, and the periods of incubation recorded. The results are convincing.

WEBSTER[5] in a paper for general consumption discusses the various antirabic vaccines at present in use, and refers to his own work with CLOW on the cultivation of the virus *in vitro* (this *Bulletin*, 1937, Vol. 34, p. 671).

PERAGALLO[6] gives further information regarding his results in the cultivation of rabies virus on the chorion-allantoid membrane of the chick. A number of illustrations, in photograph and in colour drawing, show Negri bodies in the epithelium of the infected membrane. The original inoculum is a 1 in 10 dilution of rabies brain substance. The incubation period is about 14 days. Passages have been carried up to the 18th generation.

JACOTOT and LE ROUX[7] have studied fixed virus infection in the horse and in the calf. They have also effected six passages from horse to horse, and a similar number from calf to calf. In both cases the symptoms are those of paralytic rabies, though periods of excitation may be observed in the horse. Calf virus they believe to be preferable to that of horse.

It was recognized by PASTEUR that the passage of street virus through guineapigs enhances its virulence much more readily than does passage through rabbits. HURST[8] has found that a rabbit rabies virus after passage through guineapigs becomes much more potent by the intravenous route than was the original rabbit virus. "This phenomenon is not due to any property inherent in guineapig brain *per se*. The ratio between the minimal cerebral infecting dose and the minimal intravenous infecting dose is much lower with guineapig virus: by expressing the observations in this form, it is at once made obvious that the number of infective units of guineapig virus needed to infect by the intravenous route is much smaller than of rabbit

[4] WEBSTER (Leslie T.) & CLOW (Anna D.). Propagation of Rabies Virus in Tissue Culture.—*Jl. Experim. Med.* 1937. July 1. Vol. 66. No. 1. pp. 125–131. With 1 fig. [10 refs.]

[5] WEBSTER (Leslie T.). Epidemiologic and Immunologic Experiments on Rabies. —*New England Jl. of Med.* 1937. Oct. 28. Vol. 217. No. 18. pp. 687–690.

[6] PERAGALLO (Italo). Coltura del virus rabbico nella membrana corion-allantoidea dell'embrione di pollo.—*Ann. d'Igiene.* 1937. Sept. Vol. 47. No. 9. pp. 421–425. With 5 figs. on 2 plates.

[7] JACOTOT (H.) & LE ROUX (G.). Effets produits chez le veau et chez le cheval par l'inoculation intracranienne de virus fixe. Etude d'un vaccin antirabique préparé avec la substance nerveuse centrale de ces animaux.— *Ann. Inst. Pasteur.* 1937. Nov. Vol. 59. No. 5. pp. 517–525.

[8] HURST (E. Weston). An Effect of Guinea-Pig Passage on the Virus of Rabies.— *Brit. Jl. Experim. Path.* 1937. June. Vol. 18. No. 3. pp. 205–212. With 1 chart.

virus, and the former can be said truly to be more virulent for peripheral inoculation than the latter. No evidence was obtained of local multiplication of guineapig (or rabbit) virus at a site of intramuscular inoculation."

The properties of the Hanoi strain of fixed virus, now in its 2,100th passage, are discussed by DODERO.[9] The strain remains virulent when desiccated for 6 days at 20–22 degrees centigrade in 16 per cent. of cases. After 7 days in glycerine 4, 5 and 6 day cords have lost 50 per cent. of virulence and after 15 days, 2, 3, 4, 5 and 6 day cords are practically avirulent. These results are compared with similar figures from Tunis, Saigon, Paris, Tangiers and Beirut strains.

A further and extensive contribution on the virus of the pseudo-rabies of AUJESZKY is made by REMLINGER and BAILLY.[10] The ground covered is great, and it is only possible here to give a brief indication of the main results. In this disease it appears that the virus is more regularly scattered in the brain than in rabies, avirulent zones being more frequently present (47 per cent. as compared with 10 per cent. in rabies). Although the salivary glands may be infective, still the saliva of animals which are salivating is not infective. The bite does not play any rôle in the transmission of the disease. The disease may be transmitted intravenously as well as intramuscularly, and also by ingestion of carcases of infected animals. Though immunization against rabies is easy, that against pseudo-rabies is extremely difficult. A curious characteristic of pseudo-rabies is the liability of animals to die during the night time. The virus of pseudo-rabies appears to be a unique virus, there are no varieties.

REMLINGER and BAILLY[11] after the examination of various strains of Aujeszky's virus, believe it to be a " true species " in the biological sense of the term. The various strains—French, Hungarian, Austrian and American—do not differ from each other. They now report that they have examined a Tunisian strain, and, as the result of an extensive series of experiments, find that it also behaves in the typical manner.

Further observations on the virus of pseudo-rabies are described by NICOLAU, CRUVEILHIER and KOPCIOWSKA.[12, 13] In the first place they have infected guineapigs, mice, monkeys (*Macacus* and chimpanzee), pigeons, and hens by various routes. They have detected no cross-immunity between the viruses of pseudorabies and herpes. They describe the histological appearances after infection with the pseudorabies virus as an encephalo-myelitis. In spite of the presence

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[9] DODERO (J.). Dessiccation et conservation en glycérine des moelles rabiques (virus fixe de Hanoi).—*Bull. Soc. Path. Exot.* 1937. May 12. Vol. 30. No. 5. pp. 348–352.

[10] REMLINGER (P.) & BAILLY (J.). Contribution à l'étude du virus de la maladie d'Aujeszky. (Troisième mémoire.)—*Ann. Inst. Pasteur.* 1937. July. Vol. 59. No. 1. pp. 5–38.

[11] REMLINGER (P.) & BAILLY (J.). La souche africaine de la maladie d'Aujeszky.—*Bull. Acad. Méd.* 1937. July 27. 101st Year. 3rd Ser. Vol. 118. No. 28. pp. 155–162.

[12] NICOLAU (S.), CRUVEILHIER (L.) & KOPCIOWSKA (L.). Etude sur la pseudo-rage (maladie d'Aujeszky) expérimentale.—*C. R. Soc. Biol.* 1937. Vol. 126. No. 29. pp. 563–565.

[13] NICOLAU (S.), CRUVEILHIER (L.) & KOPCIOWSKA (L.). Lésions cytologiques et présence d'inframicrobes et d'inclusions dans les tissus d'animaux infectés expérimentalement avec le virus de la maladie d'Aujeszky.—*C. R. Soc. Biol.* 1937. Vol. 126. No. 31. pp. 756–759.

of the virus in the blood and tissues, they believe that death is provoked by the localization of the virus in the nerve axis, and in the spinal ganglia.

Lépine and Sautter[14] also describe lesions found in the nervous system in pseudo-rabies.

A case of the pseudo-rabies of Aujeszky in a dog is described by Tunçman.[15] This he believes to be the first case described in Asia. The symptoms are described and appear to be typical. Rabbits were infected in the usual way by inoculation.

ii. *Symptomatology.*

A case of human rabies which occurred in the Belgian Congo is described by Chesterman and Liégeois.[16] The patient had received a full course of treatment with killed phenol vaccine.

iii. *Pathology.*

The infectivity of the saliva in the bat-borne paralytic rabies of Trinidad is examined by Pawan.[17] He has investigated cases of the disease in cattle, horses, vampire bats and human beings, and found their saliva highly infective to rabbits. The saliva was gathered by sterile swabs from the mouth.

Estimations of blood sugar in animals suffering from fixed and street virus infection have been made by Remlinger and Bailly.[18] They find that in both cases there is an elevation in titre, but of small degree.

The urea content of the blood has also been examined by the same authors,[19] and in this case they find evidence of a considerable increase in blood nitrogen in dogs and rabbits suffering from rabies.

As the result of a careful and extended series of experiments on the content in the blood of rabicidal substances after treatment by different vaccines, Dodero[20] shows that better results can be attained by vaccines which are made from cords dried over short periods (0 to 2 days) than from those prepared from cords dried over longer periods.

A somewhat similar line of research has been pursued by Cruveilhier and Viala[21] in the case of persons undergoing treatment, and of rabbits

[14]Lépine (P.) & Sautter (V.). Lésions du système nerveux dans la maladie d'Aujeszky.—*C. R. Soc. Biol.* 1937. Vol. 126. No. 31. pp. 753–756. With 3 figs.

[15]Tunçman (Zekiai Muammer). Le premier cas asiatique de la maladie d'Aujeszky observé chez un chien.—*Bull. Acad. Méd.* 1937. Oct. 12. 101st Year. 3rd Ser. Vol. 118. No. 30. pp. 240–241.

[16]Chesterman (Clement C.) & Liégeois (Paul). Un cas de rage humaine au Congo Belge.—*Ann. Soc. Belge de Méd. Trop.* 1937. Sept. 30. Vol. 17. No. 3. pp. 299–305. [13 refs.]

[17]Pawan (J. L.). Infectivity of the Saliva in Paralytic Rabies.—*Ann. Trop. Med. & Parasit.* 1937. July 13. Vol. 31. No. 2. pp. 267–270. With 1 fig.

[18]Remlinger (P.) & Bailly (J.). La glycémie des animaux atteints de rage.—*C. R. Soc. Biol.* 1937. Vol. 125. No. 21. pp. 708–711.

[19]Remlinger (P.) & Bailly (J.). L'urée sanguine dans la rage expérimentale du chien et du lapin.—*C. R. Soc. Biol.* 1937. Vol. 125. No. 16. pp. 220–222.

[20]Dodero (J.). Recherche des substances rabicides chez les mordus traités.—*Ann. Inst. Pasteur.* 1937. Oct. Vol. 59. No. 4. pp. 382–402. With 1 chart.

[21]Cruveilhier (L.) & Viala (Ch.). Pouvoir rabicide et immunité antirabique.—*Ann. Inst. Pasteur.* 1937. Aug. Vol. 59. No. 2. pp. 207–215.

experimentally immunized. Six rabbits received 15 injections, six received 18 injections, six received 21 injections, and six received 25 injections of antirabic vaccine. In the blood of 22 of the 24 animals rabicidal substances were found, after varying periods.

In an English summary of a paper by YAMAKI[22] it is stated that the *p*H of the body fluids (venous blood, subcutaneous tissue fluid) of 10 rabbits which had been experimentally infected with rabies showed an increase when paralytic symptoms supervened.

The content of vitamin C in the brain, the cerebrospinal fluid, and the aequeous humour in rabbits experimentally infected with rabies, has been estimated by UNO.[23] The 2–6 dichlorphenol indophenol method of estimation was employed. There was no fluctuation in the aequeous humour, perhaps a slight increase in the cerebrospinal fluid, and no variation in the brain substance.

iv. *Methods of Treatment and Statistics.*

A number of interesting results of experiments on factors which may influence the immunizing properties of antirabic vaccines have been carried out by SHORTT, MCGUIRE, BROOKS, STEPHENS and LAHIRI.[24] These experiments have all been carried out on monkeys. "Five tests on the relative influences of phenol (0·6 per cent.) and formalin (0·2 per cent.) upon the immunizing properties of the vaccine were carried out, of which the combined result is as follows :—

	Died Rabies	Died Otherwise	Escaped	Totals	Mortality Percentage.
Formalin ...	14	7	75	96	15·7
Phenol ...	32	8	134	174	19·2
Controls ...	36	0	15	51	70·5

This table, as the authors say, " shows a slight advantage in the use of formalin, but this is not significant." (A difference equal to or greater than that observed would be expected to occur 2 times out of 5, on the assumption that the two preservatives did not differ).

" As a considerable number of monkeys which had been used in various experiments in connection with antirabic immunization was found to be available, it was decided to utilize these in an attempt to determine the presence and degree of immunity existing six months and more after the last immunizing dose."

[22] YAMAKI (Hiroo). On the Change of the pH Value of the Body Fluid in the Experimental Hydrophobia of Rabbits.—*Oriental Jl. Dis. Infants.* 1937. May. Vol. 21. No. 3. [In Japanese. English summary p. 76.]

[23] UNO (Tojiro). Contribution to the Knowledge of Experimental Rabies; especially concerning the Vitamin-C Content (Reducing Type) of the Brain as Well as the Humour of Eye Chamber and the Cerebrospinal Fluid.—*Oriental Jl. Dis. Infants.* 1937. May. Vol. 21. No. 3. [In Japanese. English summary pp. 79–80.]

[24] SHORTT (H. E.), MCGUIRE (J. P.), BROOKS (A. G.), STEPHENS (E. D.) & LAHIRI (B. N.). The Relative Immunizing Values of Different Forms of Antirabic Vaccine, and the Duration of Immunity in Experimentally Immunized Animals.—*Indian Jl. Med. Res.* 1937. Oct. Vol. 25. No. 2. pp. 483–497.

The monkeys available were those which had escaped the results of infection with street virus in the experiments previously described, and had therefore each been through the following process of immunization :—

(*a*) A course of vaccine containing killed fixed virus.
(*b*) A single inoculation with living and fully virulent street virus.

The results may be summarized in the following table :—

	Number of Monkeys	Died		Mortality Percentage.
		Rabies	Otherwise	
1. Formalin 5 per cent. rabbit vaccine Kasauli strain ...	26	2	1	8·0
2. Formalin 5 per cent. rabbit vaccine Paris strain	24	0	0	0
3. Carbolized 5 per cent. rabbit vaccine Kasauli strain ...	23	2	1	9·0
4. Carbolized 5 per cent. rabbit vaccine Paris strain	24	0	1	0
5. Carbolized 5 per cent. rabbit vaccine polyvalent ...	25	4	0	16·0
6. Carbolized 1 per cent. sheep vaccine Paris strain	7	0	1	0
7. Carbolized 5 per cent. sheep vaccine Paris strain	8	0	0	0
8. Controls	34	24	0	70·5

It will be seen that the degree of immunity in these experiments is much higher than in the previous experiments where the monkeys were tested a few weeks after immunization with dead vaccine only, as a comparison with the first series of experiments described above will show. " The reality of this greater immunity is also evidenced by the fact that the virulence of the infecting viruses is the same as in the previous experiments." The authors are inclined to attribute this high degree of immunity to the effect of the single dose of living fully virulent virus which the animals had received, and which conferred a degree of immunity not readily obtainable with dead vaccines.

In a paper of considerable interest LÉPINE and SAUTTER[25] describe experiments undertaken to assess the relative values of dried cord vaccines and phenol vaccines. These experiments have been conducted on rabbits and the most important are as follows : (*a*) of 40 rabbits treated by the cord method (using cords of 4, 3, and 2 days), and tested by street virus at various periods after the completion of treatment, 14 resisted infection—a percentage of 35.

[25]LÉPINE (P.) & SAUTTER (V.). Essais expérimentaux sur la valeur pratique des vaccins antirabiques phéniqués.—*Ann. Inst. Pasteur.* 1937. July. Vol. 59. No. 1. pp. 39–56. [18 refs.]

Of 52 rabbits treated by phenol vaccine at differing concentrations (2, 3 and 5 per cent.), and kept at different temperatures (20° and 37°C.), tested before and after vaccination, 32 survived, *i.e.*, a percentage of 61·7. [This is a significant difference in favour of phenol vaccine, but in view of much evidence indicating that vaccination by cords and by phenol vaccines are equally efficacious, the reviewer cannot accept this result without further confirmation.]

(*b*) A comparative study of phenol vaccines of various strengths was also made from which the authors conclude without giving figures that a vaccine of less than 5 per cent. gives " optimum " results. [Figures in support of this statement are not given.]

(*c*) The influence of keeping the vaccine at 20°C. and at 37°C. was also investigated. No significant difference was found (77·7 per cent. as against 71·2 per cent. of survivors). Nevertheless the authors conclude that as no paralytic accidents have occurred, nor has there been any indication of transmission of infection by treatment with virus kept at 20–21°C., it is advisable to adopt this vaccine in preference to one kept at 37°C. [Figures in support of this conclusion are not given; the authors themselves refer to the fact that the numbers of animals employed were insufficient for absolute conclusions to be drawn. It is quite clear that the numbers were so small that no conclusions can be drawn regarding the innocuousness of the 20° vaccine, as regards either liability to cause paralytic accident, or liability in a proportion of cases to transmit infection. It will be remembered that Covell, McGuire, Stephens, and Lahiri conducted a similar experiment with the same object (this *Bulletin*, 1937, Vol. 34, p. 235). In the case of vaccine kept at room temperature, and at 37°C. for 24 hours, " no significant loss of efficiency was produced by incubating carbolized 5 per cent. antirabic vaccine at 37°C. for 24 hours." This experiment was carried out on 140 monkeys. In the face of such evidence it is impossible to accept Lépine and Sautter's conclusion.]

As he believes that vaccination by killed phenol vaccines is likely to be generally used in the future, Lépine[26] describes in detail the technique which he has elaborated for their preparation and use. He adopts a vaccine containing 5 per cent. of virulent material and 1 per cent. phenol. It is prepared from a Paris strain of fixed virus. To insure " attenuation " the vaccine is kept for 24 hours at a temperature of 20–23°C. if the vaccine is not to be used for some time, or at 37° if it is to be used immediately.

Proca, Bobes and Jonesco[27] give the results which they have attained by combining the vaccinal treatment by heated vaccines with inoculations of antirabic serum. They believe that the effect of serum treatment is to prolong the incubation period, and that it has reduced their mortality rates.

Remlinger and Bailly[28] have attempted to immunize rabbits by inhalation. The vaccine is dried, powdered, and then blown into the air passages. They have conducted 6 experiments on 45 animals

[26]Lépine (P.). Technique de préparation du vaccin antirabique phéniqué.—*Rev. d'Hyg. et de Méd. Préventive.* 1937. Oct.–Nov. Vol. 59. No. 8–9. pp. 555–562. With 2 figs.

[27]Proca (G.), Bobes (S.) & Jonesco (D.). Sérothérapie de la rage.—*Bull. Acad. Méd. Roumanie.* 1937. Vol. 4. No. 5. pp. 609–617. [11 refs.]

[28]Remlinger (P.) & Bailly (J.). Echec de la vaccination antirabique par voie pulmonaire.—*C. R. Soc. Biol.* 1937. Vol. 126. No. 25. pp. 208–210.

(rabbits and guineapigs) but the results obtained with the treated were identical with those of the controls.

The statistics of treatment at the Pasteur Institute of Paris for the year 1936 are given by CRUVEILHIER and VIALA[29]. Of 463 persons treated none has developed rabies. One case of paralytic accident is reported. The symptoms were those of double facial paralysis, which lasted for 51 days.

It is reported by VANÍČEK[30] that since 1934, vaccination according to the Jugoslavian method of HEMPT has been in use in Czechoslovakia. This method was adopted on the statistical evidence furnished by the League of Nations reports. The administration of the vaccine has been decentralized as far as was possible.

In the state of Alabama, U.S.A.[31] during the years 1922–1936, 34,864 persons received antirabic treatment and of these 42 died of the disease. The methods of treatment employed have been from 1922–1930 "commercially prepared Pasteur treatments," and from 1930 till the present time Semple treatments. The mortality rates from year to year have varied between zero and 0·18 per cent. The figures are considered in detail and compared with those in the reviewer's 6th review regarding League of Nations statistics. The Alabama results compare very favourably with these. Paralytic accidents occurred in the proportion of 1 in 6,300.

v. *Postvaccinal Paralysis.*

IDEI[32] describes a case of Landry's ascending paralysis in a woman, bitten by a dog in the right leg. The method of treatment is not stated in the German summary. The woman died of a bulbar paralysis after an illness lasting 30 days. In the opinion of the author the paralysis was due to the treatment.

REMLINGER,[33] with the object of convincing M. BABLET of the reality of cases of *rage de laboratoire,* discusses a case presenting all the features of that regrettable occurrence.

vi. *Rabies in Animals.*

The case of a dog in which all the ordinary symptoms of rabies were simulated is described by ROSELL Y CARBONELL.[34] The syndrome was in this case due to sympathetic reflexes occasioned by the local excitation of the gastric mucosa by a larva of *Noctuidos.* When the larva was expelled the symptoms ceased.

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[29]CRUVEILHIER (L.) & VIALA (Ch.). Les vaccinations antirabiques à l'Institut Pasteur en 1936.—*Ann. Inst. Pasteur.* 1937. June. Vol. 58. No. 6. pp. 721–725.

[30]VANÍČEK (F.). La vaccination antirabique décentralisée en Tchécoslovaquie par le vaccin de Hempt.—*Travaux Inst. d'Hyg. Pub. Etat Tchécoslov.* 1937. Vol. 8. No. 1. pp. 9–13.

[31]DENISON (George A.), MCALPINE (James G.) & GILL (D. G.). Rabies Deaths in Alabama. Analysis of Case Histories with Regard to Treatment.—*Amer. Jl. Public Health.* 1937. Sept. Vol. 27. No. 9. pp. 869–874.

[32]IDEI (Yositami). Ein Fall von Postlaehmung infolge der Tollwutschuetzimpfung.—*Jl. Oriental Med.* 1937. Aug. Vol. 27. No. 2. [In Japanese pp. 197–202. [13 refs.] German summary p. 19.]

[33]REMLINGER (P.). A propos de la rage de laboratoire.—*Rev. d'Hyg. et de Méd. Préventive.* 1937. June–July. Vol. 59. No. 6–7. pp. 477–478.

[34]ROSELL Y CARBONELL (Alejandro). Sindrome rabiforme producido por la existencia de una larva de la familia de los noctuidos en el tubo digestivo de un perro de 11 meses.—*Rev. Med. Trop. y Parasit.* Habana. 1937. May–June. Vol. 3. No. 3. pp. 219–223. With 1 fig.

Balozet[35] furnishes further statistics regarding the antirabic vaccination of animals in Tunis. The present figures relate mainly to the year 1935 (for previous figures see this *Bulletin*, 1933, Vol. 30, p. 142 and p. 585.) It will be remembered that the method employed is the ether vaccine of Remlinger and Bailly. A table gives a résumé of the results from 1931 to 1935. With regard to preventive treatment the number of primary vaccinations was 1,203, of re-vaccinations 434. Accidents suspected to be due to the vaccine numbered 2 (0·11 per cent.). No cases of rabies were observed amongst the vaccinated. As regards treatment after probable infection, of 32 dogs none died, of 30 horses one died, and of 25 cattle three died.

vii. *Miscellaneous.*

Rochaix[36] has examined the records relating to rabbits experimentally inoculated with fixed virus at the Pasteur Institute of Lyons for evidence of seasonal variations. He finds that the mean duration of the incubation period varied as follows:—In winter it was 6·33 days, in spring 6·64, in summer 6·76 and in autumn 6·44 days. The monthly figures show a similar swing with maximum of about 6·9 in July and minima of 6·1 in October, and 6·2 in January. A similar but much slighter variation was observed with regard to the duration of the illness. As these experiments were carried out in the dark and at constant temperature, these factors cannot be considered responsible for this apparent variation. These results are based upon a total of 3,549 rabbits treated during 21 years.

A number of experiments comparing two different carbolized vaccines (the first, vaccine A, prepared from rabbit brain, the second, B, prepared from horse brain) have been carried out by Schneider[37] with the object of ascertaining whether the sheep is as good a test animal as the rabbit. The results in the two cases were, as might be expected, very similar. The author believes that his experiments show that " the degree of protection produced depends on the amount of brain and cord tissue injected, whether it be in a single dose or multiple doses, together with the length of time between the last dose of vaccine and the injection of the infective dose."

Schweinburg and Wolfram[38] draw attention to the remarkable similarities which exist between the behaviour of rabies and pemphigus viruses, although the resulting clinical manifestations are so different. As a consequence of this observation they were led to examine the behaviour of the two viruses by cross-immunity tests. They found that *in vitro* the serum of human cases of pemphigus and of rabbits immunized against pemphigus in the majority of cases has the property of destroying rabies virus (control sera with a very few exceptions did

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[35] Balozet (Lucien). La vaccination antirabique des animaux en Tunisie du 1er janvier au 31 décembre 1935.—*Arch. Inst. Pasteur de Tunis.* 1936. Apr. Vol. 25. No. 2. pp. 353–361.

[36] Rochaix (A.). Saisons et rage expérimentale chez le lapin.—*Mouvement Sanitaire.* 1937. June. Vol. 14. No. 158. pp. 306–309. With 2 charts.

[37] Schneider (J. E.). The Utilization of Sheep in the Rabies Vaccine Protection Tests.—*Jl. Amer. Vet. Med. Assoc.* 1936. Dec. Vol. 89. No. 6. pp. 671–676.

[38] Schweinburg (Fritz) & Wolfram (Stefan). Ueber serologische und immunologische Beziehungen zwischen den Erregern des Pemphigus und der Lyssa.—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1937. Oct. 15. Vol. 91. No. 4. pp. 341–360. [31 refs.]

not possess this property), and that conversely rabies immune sera killed pemphigus with even greater regularity. Similarly *in vivo* it appeared that rabbits immune to rabies were also in most cases protected against pemphigus infection. Rabbits immunized against pemphigus are on the other hand *sometimes* immune to rabies.

SCHOEN[39] following on experiments by LEVADITI and himself in which they found that street virus grows in the Brown-Pearce carcinoma (this *Bulletin*, 1937, Vol. 34, p. 678, and 1936, Vol. 33, p. 750), now extends their observations to other strains of virus, and to fixed virus. He has succeeded in many cases in transmitting infection by grafting of infective tumours on to the cornea. Negrigenesis is not, however, constant in the neoplastic tissue.

A communication from Bavaria in the *Reichs-Gesundheitsblatt*[40] deals with the measures to be adopted when a person is bitten by a rabid animal. It deals both with the care and treatment of the bitten person and with the handling of the biting animal.

A short general paper on rabies, and the procedure of antirabic treatment is given by FRENCH.[41] *A. G. McKendrick.*

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[39]SCHOEN (R.). Virus rabique de néoplasmes.—*C. R. Soc. Biol.* 1937. Vol. 125. No. 23. pp. 939–941.

[40]REICHS-GESUNDHEITSBLATT. 1937. Nov. 24. Vol. 12. No. 47. pp. 772–774.—Wutschutzbehandlungsstellen und Richtlinien zur Wutschutzbehandlung.

[41]FRENCH (S. Gay). Rabies in China, with Notes on Six Cases of Pasteur Treatment.—*Jl. Roy. Nav. Med. Serv.* 1937. Oct. Vol. 23. No. 4. pp. 310–314.

LEISHMANIASIS.

Castillon (T. J. E. L.). Le kala-azar en France. [**Kala Azar in France.**]—*Rev. Service Santé Milit.* 1937. May. Vol. 106. No. 5. pp. 701–750. With 1 fig. [207 refs.]

The article is a complete description of kala azar, with special reference to the disease in France. Published in an army journal, it is intended to instruct army medical officers and to warn them to be on the look-out for cases of the disease in France, which are by no means uncommon. *C. M. Wenyon.*

Monges (J.), Giraud (P.) & Monges (F.). Deux nouveaux cas de kala-azar autochtone de l'adulte. [**Two New Cases of Endemic Kala Azar in the Adult.**]—*Bull. Soc. Path. Exot.* 1937. Apr. 14. Vol. 30. No. 4. pp. 274–279.

In reporting two cases of kala azar in adults in the Marseilles district the authors point out that this disease in adults can no longer be regarded as a rarity in the South of France. There was nothing peculiar about these cases, both of which responded to neostibosan and were cured. *C. M. W.*

Vanni (Vittorio). Leishmaniosi viscerale dell' adulto autoctona a Venezia. [**Endemic Kala Azar in an Adult in Venice.**]—*Policlinico.* Sez. Prat. 1937. June 14. Vol. 44. No. 24. pp. 1148, 1151–1152.

The discovery of a case of kala azar in an adult in Venice adds another locality to the list given by Ascoli of the places in Italy where this disease in adults occurs. *C. M. W.*

Mi (C. H.) & Yang (C. T.). **Kala-Azar in Nanchang.**—*Chinese Med. Jl.* 1937. May. Vol. 51. No. 5. pp. 669–670.

The record of a case of kala azar in a soldier 40 years of age in Nanchang. This is the first case of the disease to be diagnosed in this place, but there is evidence that infection occurred north of the Yangtze river. *C. M. W.*

Sangiorgi (Giuseppe). Pluralità del virus donovanico? [**Plurality of *Leishmania donovani* Virus?**]—*Pathologica.* 1937. Apr. 15. Vol. 29. No. 546. pp. 140–142. English summary (10 lines).

Examining smears of spleen puncture material from a case of kala azar in an adult in Italy the author finds that there were two types of parasite in the smear, so that he considers that two different leishmanias are represented. This duality of species has no relation to the distinctions which can be drawn between *L. donovani* and *L. infantum* on aetiological grounds. *C. M. W.*

Laurinsich (A.). Coltivabilità del parassita di Leishman nel latte di capra. [**Culture of Leishmania in Goat's Milk.**]—*Pediatria.* 1937. Oct. 1. Vol. 45. No. 10. pp. 857–866. [10 refs.]

The author has tested the effect of adding goat's milk to culture media for leishmania. The best results were obtained by adding milk, after separation of fat, to the liquid of condensation in N. N. N. medium. *C. M. W.*

HENDERSON (L. H.). **Clinical Observations on Kala-Azar in the Fung Province of the Sudan.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1937. July 31. Vol. 31. No. 2. pp. 179–190. With 1 map in text & 4 figs. on 3 plates.

The paper gives a clinical and epidemiological account of kala azar as seen by the author in over 300 cases treated by him between 1933 and 1936 in the Fung province of the Sudan. The paper should be read in conjunction with that by ARCHIBALD and MANSOUR (this *Bulletin*, 1937, Vol. 34, p. 567) on the same subject. The cases occurred in the villages along the Blue Nile and its tributaries from the Abyssinian border to a point about 150 miles south of Khartoum. In this district the river flows through an open flat plain of thick loam and falls only 200 feet in 200 miles. The temperature rarely falls below 60°F., while the mean relative humidity is from 50 to 55 per cent. The rainy season commences in April with a 10 mm. rainfall. This reaches a maximum in August with 200 mm. and then subsides up to the commencement of the dry season in November. As far as could be judged the majority of cases showed their first symptoms between August and February. The disease attacks mainly children and young adults and was most liable to occur amongst those in a state of malnutrition. There were exceptions to this rule, however, as cases occurred amongst the well-fed police. A history of familial infection was not uncommon. The parasite was always present in the spleen, in 1 per cent. of the cases in the blood and in 7·5 per cent. in the nasal secretion. The symptomatology was similar to kala azar elsewhere. As regards treatment the routine procedure was adopted of giving a course of neostibosan followed by one or two courses of tartar emetic. To this treatment the children responded more readily than the adults, amongst whom were some peculiarly resistant cases. *C. M. W.*

WRIGHT (R. E.). **Affections of the Eye in the Malarial Fevers and Kala-Azar.**—*Indian Med. Gaz.* 1937. June. Vol. 72. No. 6. pp. 363–367. [18 refs.]

The paper discusses eye lesions in malaria and kala azar and points out that retinal haemorrhages into the posterior segment of the eye appear to be the only conditions which can claim to have relation to these diseases. Even these are perhaps more dependent on the severity of the anaemia than on the toxaemia. Malarial keratitis was at one time regarded as a possibility but is now looked upon more doubtfully. *C. M. W.*

NAPIER (L. Everard). **Pulmonary Tuberculosis and Kala-Azar: a Fatal Combination.**—*Indian Med. Gaz.* 1937. Apr. Vol. 72. No. 4. pp. 242–243. With 2 figs. on 1 plate & 1 chart.

The author notes that it is the experience in Calcutta that when kala azar is accompanied by some other disease or infection it is the kala azar which should be treated first. The presence of these other infections has not interfered with or hindered in any way the good effects of antimony medication. There is, however, one serious exception and this is pulmonary tuberculosis. The antimony treatment appears to aggravate this condition and two illustrative cases are

mentioned. It would appear, therefore, that kala azar in the presence of pulmonary tuberculosis is a very serious condition, for which there is no satisfactory treatment. *C. M. W.*

Chagas (E.) & Romana (Cecilio). Etude sur la leishmaniose viscérale en Argentine. Infection des ganglions lymphatiques. [**Visceral Leishmaniasis in the Argentine. Infection of the Lymphatic Glands.**]—*C. R. Soc. Biol.* 1937. Vol. 125. No. 15. pp. 170–171. With 2 figs.

The authors give a short account of a disease, two cases of which they have encountered in the Chaco district of the Argentine. The symptoms appear to resemble those of kala azar, while a leishmania can be demonstrated within endothelial cells in smears of liver and spleen puncture material and in sections of excised lymphatic glands. The parasites, like other leishmania, develop into leptomonas in suitable media. The relation of this disease to the visceral leishmaniasis of other parts of S. America, Africa and Asia has not yet been determined. *C. M. W.*

Wang (C. W.). **The Examination of Blood Smears for *Leishmania donovani* in Kala-Azar Patients.**—*Chinese Med. Jl.* 1937. Sept. Vol. 52. No. 3. pp. 433–438.

By means of Shortt's technique the peripheral blood of 23 proved cases of kala azar was examined for leishmania. Parasites were found in 39·1 per cent. of the cases at all stages of the disease. In Shortt's technique the blood film is made in the usual manner, with the exception that the movement of the spreading slide is stopped towards the end of the film. It is then lifted quickly so that there is given to the film a straight end in which numbers of leucocytes are gathered. Infected cells are, however, frequently found in the lateral margins of ordinary blood films. *C. M. W.*

Malamos (Basilios). Versuche mit Leishmanien. I. Immunisierungsversuche von Hamstern mit Kulturen und Immunseren. II. Der Einfluss von Kaninchenimmunserum auf das Wachstum verschiedener Kulturen. [**Experiments with Leishmania. I. Attempts to immunize Hamsters with Cultures and Immune Serum. II. Influence of Immune Rabbit Serum on Growth of Various Cultures.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1937. May. Vol. 41. No. 5. pp. 416–422. [21 refs.]

It was found impossible to immunize hamsters against *Leishmania donovani* infection by injecting them with living avirulent cultures of the organism, nor could hamsters be cured of an infection by the administration of immune serum prepared in rabbits. The immune serum tended, however, to prolong the disease. The addition of immune serum to cultures tended to retard the growth of leishmania to some extent but, contrary to the results obtained by Noguchi and da Fonseca, there was no specific action as regards different species of parasite. *C. M. W.*

Malamos (Basilios). Versuche mit Leishmanien. III. Atypischer Verlauf einer Leishmania donovani-Infektion bei der weissen Maus. [**Experiments with Leishmania. III. Atypical Course of a *Leishmania donovani* Infection in White Mice.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1937. Oct. Vol. 41. No. 10. pp. 641–644. With 1 fig. [13 refs.]

A strain of *Leishmania infantum* was isolated from a patient in white mice, in which a generalized infection was produced. A second passage produced the same type of infection, as also did the third in one animal, whereas in another there developed 425 days after injection an ascites characterized by a blood-stained exudate which recurred each time after withdrawal. Examination of the animal after death on the 456th day showed that there was a very intense leishmania infection of the pancreas and only a light infection of other organs. At no time, either by direct examination of smears, culture or inoculation of animals, was it possible to demonstrate leishmania in the peritoneal exudate. *C. M. W.*

Weese (H.). **Important Pharmaceutical Aspects of Solustibosan.**—*Chinese Med. Jl.* 1937. Sept. Vol. 52. No. 3. pp. 421–424.

In this paper the author gives an account of pharmacological experiments carried out on animals with solustibosan. In reasonable doses there is little if any local irritation following subcutaneous, intracutaneous, intramuscular or intravenous injections. The mouse will tolerate a subcutaneous dose of 43 cc. per kilo of body weight, this amount being 25 per cent. more antimony than the corresponding tolerated dose of neostibosan. Intravenously the mouse will survive a dose of solustibosan representing three times the amount of antimony in the tolerated dose of neostibosan. This is due to the fact that in the dog after injections of solustibosan 80 per cent. of the antimony is excreted in the first 24 hours as against 50 per cent. for neostibosan. Experiments carried out on heart-lung preparations and smooth muscles showed that the drug was not irritating, while no temperature reactions followed its injection. The animal experiments indicated that solustibosan could be given to animals without harmful effect, a result which was confirmed by injections in human beings.

C. M. W.

Struthers (E. B.). **The Treatment of Kala-Azar with Solustibosan, a New Antimony Compound.**—*Chinese Med. Jl.* 1937. Sept. Vol. 52. No. 3. pp. 335–338.

The author gives an account of the treatment of 29 cases of kala azar in Tsinan with solustibosan, which is issued by Bayer & Co. in the form of a sterile stable solution of "pentavalent antimony hexonate" which contains 0·02 gm. of pentavalent antimony in 1 cc. As regards toxicity the mouse will tolerate 25 per cent. more antimony in the form of solustibosan than in the form of neostibosan. This greater tolerance is explained by the experiment in dogs which shows that the excretion of antimony in the urine is greater in the first 24 hours with solustibosan than with neostibosan. In the treatment of the cases the doses employed corresponded with the neostibosan dosage. Thus 2 cc. of solustibosan is approximately equal to 0·1 gm. of neostibosan which

contains 42 mgm. of antimony. This dose was given on the first day and there followed doses of 6 cc. given on alternate days, or sometimes daily, till a total of 59 to 84·5 cc. had been given. In this series the injections have been by the intravenous route. The general result shows that of 26 cases which completed treatment 22 were discharged cured. It is evident that solustibosan will cure kala azar, that it is relatively non-toxic and that it has succeeded in certain cases which had not been cured by a full course of neostibosan. It has proved particularly valuable in several cases in the late toxic stage complicated by severe cancrum oris. *C. M. W.*

YATES (Theo. M.). **"SDT. 561" in the Treatment of Kala-Azar.**—*Chinese Med. Jl.* 1937. Sept. Vol. 52. No. 3. pp. 339–344.

The author describes the treatment of 82 cases of kala azar by means of solustibosan. The total dosage has usually been 60 cc. for every 100 lb. of body weight. One exceptional case, however, had 94 cc. in 26 injections. As there were no toxic symptoms the daily dosage was increased towards the end of the series, so that in nine cases the course was completed in five days. Several adults were actually given injections of 20 cc. without revealing any toxic effects. Of the cases treated 95·1 per cent. were discharged improved. This figure is compared with the figure of 94·6 per cent. for 629 cases treated the year before with another pentavalent antimony compound. It was generally admitted that the cases in which the treatment was completed in five days progressed better than the others. The new compound is evidently efficacious in the treatment of kala azar and has the advantage of being in the form of a stable solution which is ready for intravenous or intramuscular injection.

C. M. W.

NAPIER (L. Everard), CHAUDHURI (R. N.) & CHAUDHURI (M. N. Rai). **A Stable Solution of Antimony for the Treatment of Kala-Azar.**—*Indian Med. Gaz.* 1937. Aug. Vol. 72. No. 8. pp. 462–465. With 3 charts.

The authors have tried the new Bayer antimony product, No. 561, in the treatment of 10 cases of kala azar in Indians in Calcutta. The drug is issued in solution in ampoules and appears to be quite stable. In 1 cc. there are 20 mgm. of antimony (metal) as compared with 21 mgm. in a 5 per cent. solution of neostibosan. It is administered intramuscularly. Nine of the cases received 10 injections and one 8 injections. These were given on alternate days in six cases and daily in four. The total amount of antimony administered varied from 0·96 to 1·74 gm. The results were very satisfactory and, judging from the cessation of fever, increase in weight and improvement in the blood picture, it seems probable that all the cases were cured. The trials suggest that the drug is in the same class as neostibosan and the fact that it is stable in solution and can be given intramuscularly without causing damage to the tissues indicates that its introduction constitutes a distinct advance in the treatment of kala azar.

C. M. W.

KIKUTH (Walter) & SCHMIDT (Hans). **Contribution to the Progress of Antimony Therapy of Kala-Azar.**—*Chinese Med. Jl.* 1937. Sept. Vol. 52. No. 3. pp. 425–432. [25 refs.]

The authors give an interesting account of the introduction of the European hamster as an experimental animal for the testing of leishmanicidal drugs. The hamster inoculated intraperitoneally with heavily infected liver or spleen emulsion from another animal invariably becomes infected. In three months the infection is sufficiently heavy to commence a test. Usually drugs are given subcutaneously twice a week for five weeks, the infection being controlled by liver puncture and serological tests. In this way solustibosan was arrived at, which is characterized by its low toxicity, allowing larger quantities of antimony to be administered in this form than in the usual pentavalent organic antimony compounds, such as neostibosan, neostam, urea stibamine, etc. *C. M. W.*

LE HULUDUT. Difficultés de traitement du kala-azar Indien. Premiers essais de l'anthiomaline. [**Difficulty of Treatment of Indian Kala Azar. First Trials with Anthiomaline.**]—*Rev. Méd. et Hyg. Trop.* 1937. Mar.–Apr. Vol. 29. No. 2. pp. 73–84. With 3 charts.

The author has treated seven cases of Indian kala azar with anthiomaline and has obtained satisfactory results. He says he was led to try this remedy owing to the unsatisfactory character of the treatment usually employed for this disease in India. He bases this statement on the opinions expressed in papers many years old and does not appear to be aware of the very excellent results which have been obtained in recent years by the use of neostibosan and similar drugs.

C. M. W.

TARTAGLIA (Peter). La leishmaniose canine à Split. [**Canine Kala Azar at Split.**]—*Bull. Office Internat. d'Hyg. Publique.* 1937. Sept. Vol. 29. No. 9. pp. 1927–1930. With 1 map.

Writing of kala azar on the coast of Yugoslavia, it is noted that the canine disease is present in Split to the extent of 7 to 8 per cent. of the animals examined. These do not show any clinical signs of the disease. The human cases are more commonly found in the villages than in the towns and wherever they occur the presence of the sandfly, *Phlebotomus major*, has been demonstrated. *C. M. W.*

LEE (C. U.). **Canine Leishmaniasis in Peiping. A Preliminary Communication.**—*Chinese Med. Jl.* 1937. June. Vol. 51. No. 6. pp. 951–952.

The author records the presence of canine kala azar in Peiping. One case was in a stray, the only animal found infected in 90 examined. The other case was in a carefully guarded house-dog which was associated with a child suffering from the disease. *C. M. W.*

Hovnanian (Philipp), Jebejian (Robert) & Yenikomshian (H. A.). **Dermal Leishmaniasis in a Newly Inhabited Section of Aleppo.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1937. July 31. Vol. 31. No. 2. pp. 191–198. With 5 figs. (3 on 1 plate).

For 10 or more years a group of refugee immigrants had occupied a camp in Aleppo. They were then moved to a new site on which were being constructed houses built of mud and straw bricks. The new site was originally an orchard and when the first refugees moved there it was only partially cleared. Sandflies abounded and within two months cases of oriental sore began to appear. Within a year the disease had appeared in 45 of 127 families which had moved there. The infected families comprised 181 individuals, of which 78 were attacked, and of these 55 were children below 12 years of age. Seven persons acquired oriental sore for a second time, there being in them evidence of previous infection in the shape of the characteristic scars and a history of having had Aleppo sore in the past. These second attacks were mild in character and of short duration. Practically all the cases occurred amongst those who came to the new site in the summer and autumn of 1935. With the completion of the building and the clearing of the site, sandflies became less numerous and the new cases of infection were reduced to a low level. *C. M. W.*

Poggi (Igino). Il bottone d'oriente (Ghesoà) nell' Agamé (Tigrai Orientale). [**Oriental Sore in Agamé (Abyssinia).**]—*Arch. Ital. Sci. Med. Colon. e Parassit.* 1937. Mar. Vol. 18. No. 3. pp. 131–137. With 5 figs.

The author records the presence of oriental sore amongst the population of Agamé in Abyssinia and describes and illustrates a number of typical cases. *C. M. W.*

Bogliolo (Luigi). Studi sulle leishmaniosi. IX. Sull' istologia patologica della leishmaniosi cutanea (da *L. tropica*). Con alcune considerazioni sopra i rapporti fra leishmanie e cellule del sistema reticolo istiocitario. [**Histo-pathology of Cutaneous Leishmaniasis.**]—*Riv. di Parassit.* Rome. 1937. July. Vol. 1. No. 3. pp. 221–258. With 8 figs. [50 refs.] English summary (5 lines).

The paper describes in detail the histology of the lesions in six cases of oriental sore studied in Italy. It is impossible to summarize the results, but it may be pointed out that the author concludes that the granuloma caused by *Leishmania tropica* is at times indistinguishable from tuberculous lesions of the skin or from tuberculoids.

C. M. W.

Gonzalez (Gustavo) & Olivera y Silva (M.). La leishmaniosis forestal americana en la guerra del Chaco. [**Forestal American Leishmaniasis in the Chaco War.**]—*9a Reunión Soc. Argentina Patol. Regional, Mendoza, 1, 2, 3 y 4 octubre 1935.* Vol. 2. pp. 959–974. With 14 figs. (1 folding map).

This is a general account of cutaneous leishmaniasis which occurred in epidemic form in the Chaco district of Paraguay during the

disturbances brought about by the recent war. The distribution of the cases is illustrated on a map and the varied character of the lesions is shown in a series of photographs. *C. M. W.*

GONZALEZ (Gustavo), BOGGINO (Juan) & RIVAROLA (Juan B.). Linfangitis y adenopatías en las lesiones cutáneas de la leishmaniosis americana. [**Lymphangitis and Adenitis in Cutaneous Leishmaniasis of S. America.**]—*9a Reunión Soc. Argentina Patol. Regional, Mendoza, 1, 2, 3 y 4 octubre 1935.* Vol. 2. pp. 753–771. With 14 figs. [38 refs.]

The occurrence of lymphangitis in connexion with cutaneous leishmaniasis has been noted by many observers, whose records are reviewed by the authors in this paper. They note that amongst cases of this disease seen by them in Paraguay about 12 per cent. show evidence of involvement of the lymphatics draining the region of the sore. In connexion with this lymphangitis there is enlargement of the nodes, which have been studied histologically. The enlargement is due to proliferation of the reticulo-endothelial system together with giant cell formation. The constant presence of leishmania proves that the lymphangitis is definitely due to these organisms which have reached the nodes as infarcts from the skin lesion.

C. M. W.

DEANE (L.) & DEANE (G.). Estudos sobre a leishmaniose visceral americana. Nota No. 1. Aspectos clinicos da doença. Nota No. 2. Sobre o valor da reacção do formol-gel no diagnostico da leishmaniose visceral americana. [**Studies on S. American Kala Azar. 1. Clinical Aspects. 2. Diagnostic Value of Formol-Gel Test.**]—*Hospital.* Rio de Janeiro. 1937. Aug. Vol. 12. No. 2. pp. 189–199. With 5 figs. pp. 201–202.

CHAGAS has reported that in carrying out the formol-gel test in a case of S. American kala azar a positive result was obtained in four minutes. A number of cases of other diseases tested had given no positive reading in an hour. The authors of the present paper have similarly tested four cases of S. American kala azar and obtained a positive reaction in all, the longest time being four and a half minutes. In 217 cases of other diseases and 12 normal individuals the test was sometimes positive, the shortest time being 11 minutes. In the majority of cases the time was an hour or more or the reaction was quite negative. *C. M. W.*

YOUNG (A. Greville). **Oriental Sore simulating Leprosy.**—*Indian Med. Gaz.* 1937. July. Vol. 72. No. 7. pp. 421–422. With 1 fig.

The case described is that of a Brahmin woman who had five purple coloured nodules on the left arm and three on the right. The five nodules were in an area of skin of about five or six square inches. As the skin was anaesthetic between the nodules the case was treated as leprosy for three months. Finally, oriental sore being suspected, leishmania were discovered. Application of tartar emetic ointment was followed by sloughing and complete healing in fifteen days.

C. M. W.

GASPERINI (G. C.). Un caso di leishmaniosi delle mucose messo in evidenza dai fenomeni allergici provocati. [**A Case of Leishmaniasis revealed by the Allergic Phenomena provoked.**]—*Arch. Ital. Sci. Med. Colon. e Parassit.* 1937. July. Vol. 18. No. 7. pp. 430–432.

Having under observation a case of ulceration of the outer and inner surfaces of the lip the author suspected its leishmanial nature but could obtain no positive serological reaction. However, the injection into the skin of the deltoid of an antigen prepared from cultures of *Leishmania donovani* produced an area of oedema developing into an indurated papule which did not subside for about eight days. At the same time the axillary glands became swollen and painful. It is concluded that this was a positive response and gave evidence of the character of the sore. *C. M. W.*

RAYMOND (R. L.); CRUICKSHANK (M. M.); RAYMOND (R. L.) **Clinical Study of Sixty-Three Cases of Oriental Sore.** [Correspondence.]—*Indian Med. Gaz.* 1937. June & Aug. Vol. 72. Nos. 6 & 8. pp. 390; 518–519.

In commenting on the paper by GOODALL (this *Bulletin*, 1937, Vol. 34, p. 576) the writer of the first letter states that his experience in Quetta showed that the usual antimony and berberine treatments of oriental sore were unsatisfactory and that the best results were obtained by thoroughly scraping the sore under gas anaesthesia, applying pure carbolic acid and covering directly with elastoplast or ordinary adhesive plaster, the whole being then well bandaged. The plaster is left *in situ* for 14 days; when it is removed in about 90 per cent. of cases it will be found that complete healing has occurred. In the unhealed 10 per cent. the plaster is again applied and left for a further 14 days. In a few cases a second scraping will be necessary. It is claimed that the Quetta experience shows that this treatment is the method of choice. This letter called forth an editorial comment that the statement was based on clinical impressions and that the advantage of the treatment could not be regarded as a clinical fact, as precise comparative tests had not been made. The letters in the later number of the *Gazette* give further testimonies in favour of the treatment and reveal an unrepentant editor, who still argues in favour of the clinical impression idea as against that of the clinical fact.

C. M. W.

HOLMES (F.). **Mass Treatment of Oriental Sores.**—*Jl. Roy. Army Med. Corps.* 1937. Oct. Vol. 69. No. 4. pp. 258–260.

After the earthquake in Quetta in 1936 conditions became very favourable for the breeding of sandflies, with the result that numerous cases of oriental sore occurred amongst the British and Indian troops, as also amongst dogs. Various treatments were tried till finally the mass infections were dealt with by thorough scraping of the sore under gas anaesthesia, followed by the application of pure carbolic acid and a cover of elastoplast. The cover is left in position for two weeks. If it comes off it is renewed. Trivalent antimony compounds, either alone or in combination with the scraping treatment, were effective. Pentavalent antimony compounds were less satisfactory. *C. M. W.*

MALARIA.

Morin (H. G. S.) & Moreau (P.). Sur les possibilités d'utilisation des poissons à la lutte contre le paludisme en Indochine. [**Utility of Fish in Anti-Malaria Work in Indo-China.**]—*Arch. Inst. Pasteur d'Indochine.* 1936. Oct. Vol. 6. No. 24. pp. 485–505. With 1 plate. [100 refs.]

The papers which precede this contribution in this number of the *Archives* also deal exclusively with the possible utilization of fish as a contribution to antimalaria work in Indo-China. There is a general discussion of the subject and an account of the results achieved in different parts of the world, notably in Java. An account is given of experiments carried out in Indo-China with *Girardinus guppyi* (millions) and *Gambusia affinis*. A list is given of the indigenous fish collected by the Anti-Malaria Services of the Pasteur Institutes of Indo-China and a key for the identification of local species of freshwater fish. There is also a zoological description of those species that are likely to be of service in anti-malaria work. The paper under review sums up the question from a practical point of view. In the north of Indo-China, Tonking and Northern Annam, the season when anti-larval measures are most important is the season when the larvicidal propensities of fish are at a low ebb. Here any attempts at stocking collections of water with fish should be concerned mainly with larger omnivorous varieties which might be a valuable addition to the local food supplies of a poor population. In the centre and in the south of Annam, however, the use of small larvicidal fish promises to be of great utility. Here *Girardinus* is readily acclimatized and here too the indigenous *Macropodus opercularis*, introduced into a small marsh together with an aquatic plant, *Pistia stratiota*, succeeded in eliminating *A. minimus* larvae, which had been very numerous. There seems to be no doubt that *Gambusia* will likewise thrive in this part of the country. The authors stress the importance of instructing the native population, especially the children, regarding the useful rôle that these fish are expected to play ; otherwise the fish are little likely to survive.

Norman White.

Le Roy (G.). Un cas de paludisme pernicieux simulant la méningite cérébro-spinale. [**Case of Pernicious Malaria simulating Cerebro-spinal Meningitis.**]—*Bull. Soc. Path. Exot.* 1937. Oct. 13. Vol. 30. No. 8. pp. 664–671. [22 refs.]

A young man was admitted to hospital in Tunis as a case of cerebro-spinal meningitis. He had had 52 months service in Tunis, but had never suffered from malaria. He presented all the characteristic symptoms and signs of that disease, except herpes, erythema and a polynuclear leucocytosis. The intrathecal injection of serum that was administered certainly appeared justified. An examination of the spinal fluid collected on the day of admission negatived this diagnosis : the fluid was practically normal. The patient grew rapidly worse and there appeared to be no hope of his recovery, when on the eighth day a very heavy *falciparum* infection was discovered. Quinine

treatment and complete recovery followed. Full details of this instructive case are given and reference is made to similar cases reported in the literature. *N. W.*

Roger (H.) & Boudouresques (J.). A propos d'un cas de polynévrite paludéenne [**Case of Malarial Polyneuritis.**]—*Bull. Soc. Path. Exot.* 1937. Oct. 13. Vol. 30. No. 8. pp. 671–675.

In times gone by cases of polyneuritis were not infrequently ascribed to malaria. In many of these alcohol, or beriberi, or even dysentery was responsible for the condition. The authors assert that genuine cases of malarial polyneuritis do occur, though they are rare. One such case is described, that of a young married woman who, during three years in Morocco, had suffered from repeated attacks of malignant tertian malaria. The onset of neuritic symptoms occurred during one of these febrile attacks : paraplegia became complete. Alcoholism, venereal disease and beriberi could all be excluded as aetiological factors. The parasite could always be demonstrated in the peripheral blood during any exacerbation of the symptoms. The administration of antimalarial drugs resulted in complete cure though convalescence was very protracted. *N. W.*

Farinaud (E.) & Moreau (P.). Etat actuel de la prophylaxie du paludisme par médicaments synthétiques en Indochine, ses indications, ses limites. [**Present State of the Prevention of Malaria in Indo-China by Administration of Synthetic Drugs : Indications for their Use ; their Limitations.**]—*Bull. Soc. Méd.-Chirurg. Indochine.* 1937. June–July. Vol. 15. No. 6. pp. 567–582.

Malaria is hyperendemic in a great part of Indo-China. Cases are most numerous at the beginning and end of the rains, July, August and September, and again from December to March inclusive. In practice this amounts to an almost unbroken period of active transmission from July to March. There are places indeed where *A. minimus*, by far the most important vector, breeds throughout the year and where the infant endemic index remains constantly above 60 per cent. In such circumstances as these, though the prophylactic use of synthetic drugs confers great benefits, such benefits are very temporary and are lost completely within two months of the cessation of this prophylactic treatment. Almost continuous treatment is neither practicable nor desirable. In such hyperendemic areas antilarval measures are indispensable : if these be based on a thorough study of the local problem a more limited use of synthetic remedies is a valuable aid to successful results. There are a few areas of moderate endemicity, with a marked and limited seasonal prevalence of the disease, in which the use of synthetic remedies as the sole measure of prophylaxis has given good and lasting results. *N. W.*

Marneffe (H.). Un essai de prophylaxie du paludisme par les médicaments synthétiques chez l'enfant. [**Prevention of Malaria by Administration of Synthetic Remedies to Children.**]—*Bull. Soc. Méd.-Chirurg. Indochine.* 1937. June–July. Vol. 15. No. 6. pp. 582–589. With 5 charts.

This attempt at prophylaxis was carried out in an Annamite village where, among children from 2 to 15 years of age, the splenic index

was 66·6 per cent., the parasite index 69·8 and the gamete index 52·1 per cent. *A. minimus* and *A. jeyporiensis* are the local vectors. The children were divided into four groups. The first group were all infected; after a curative treatment with quinacrine and praequine they were given a dose of quinacrine each Monday and Thursday. In the second group quinacrine was replaced by quinine, the prophylactic follow up treatment being given every day except Sundays. The third and fourth groups consisted of children apparently not infected. The children in the third group received quinine every day except Sundays: those in the fourth group quinacrine each Monday and Thursday. The original intention was to continue the experiment throughout a year; it lasted but seven weeks. The Sister in charge of the experiment fell ill. The author concludes from this limited experiment that treatment with quinacrine and praequine causes an immediate drop of parasite and gamete indices; that quinacrine is superior to quinine in this respect, and that the follow up treatment with quinacrine or quinine, though capable of keeping these indices at a low level for some weeks, does not prevent them gradually attaining their former levels. *N. W.*

Gosio (R.). Sondaggio di contrattilità della splenomegalia malarica e trattamento adrenalinico dello "strato malarico." [**Measurement of the Contractability of the Enlarged Spleen of Malaria and the Adrenalin Treatment of Chronic Malaria.**]—*Riv. di. Malariologia.* Sez. I. 1937. Vol. 16. No. 2. pp. 123–141. With 2 plates. German summary. [25 refs.]

The author describes the radioscopic technique that has enabled him to determine the persistence, and measure the degree, of the contraction of the malarial enlarged spleen resulting from adrenalin treatment. With regard to diminution in the size of the spleen the contraction of the organ which follows immediately the injection of a single dose of the drug, and which is temporary, must be distinguished from the permanent decrease in bulk that is brought about by a series of intravenous injections. The degree of the former gives some indication of the probable results of this form of treatment. The paper contains a full and interesting discussion of Ascoli's method of treatment and its *modus operandi*. The author considers it to be specific in the treatment of the *stato malarico*. *N. W.*

Watson (Robert B.) & Spain (E. L.), Jr. **Studies on Malaria in the Tennessee Valley. The Influence of Physiography on the Occurrence of Breeding Places of *Anopheles quadrimaculatus* in Northern Alabama.**—*Amer. Jl. Trop. Med.* 1937. Mar. Vol. 17. No. 2. pp. 289–305. With 5 figs. (2 maps).

A description of the physiography of northern Alabama and of the natural breeding places of *A. quadrimaculatus* is followed by a short discussion of the probable effect of impounding the water of the Tennessee on the prevalence of this anopheline. The opinion is expressed that malaria transmission will be lessened, rather than increased, by the creation of the lakes, provided that modern antilarval measures are carried out throughout the breeding season. *N. W.*

Sen (P.). **The Relative Prevalence of Anophelines in Houses and Cattle-Sheds in Deltaic Bengal.**—*Records of the Malaria Survey of India.* 1937. June–Sept. Vol. 7. Nos. 2 & 3. pp. 147–153. With 2 charts.

This is a study of the diurnal resting places of anophelines in villages on both banks of the Hooghly, downstream from Calcutta. It is based on the capture of 15,453 anophelines throughout a year. The number of the different species caught in the year, per ten standardized catches a month, and the relative prevalence of each species, per cent., in houses and cattle sheds, were as follows :—

	Houses		Cattle-Sheds	
	No. Caught	Percent. of Total	No. Caught	Percent. of Total
A. barbirostris	62	6·2	104	7·7
A. hyrcanus	83	8·4	246	18·3
A. subpictus	171	17·3	294	21·9
A. vagus	263	26·6	220	16·4
A. sundaicus	97	9·8	74	5·5
A. annularis	263	26·4	329	24·5
A. philippinensis ...	7	0·7	4	0·39
A. ramsayi	11	1·1	26	1·9
A. varuna	13	1·3	25	1·86
A. aconitus	18	1·8	21	1·5
A. culicifacies	1	0·1	1	0·09

N. W.

Mosna (Ezio). Sulle caratteristiche termiche dei focolai di *Anopheles maculipennis.* [**Temperature and Development of** *A. maculipennis.*]—*Riv. di Parassit.* Rome. 1937. Apr. Vol. 1. No. 2. pp. 139–155. With 1 fig. & 1 graph. English summary (9 lines).

The paper describes laboratory experiments carried out under controlled conditions of temperature and devised to give precise information about the rate of development of the early stages of two races of *Anopheles maculipennis.*

The larvae were reared in dishes in a thermostat, the temperature of the water in the bath being recorded continually. [As the dishes were covered one may assume that evaporation did not occur, so that probably the temperature of the dishes and of the water bath are identical.] One series was run at constant temperature and the other at temperatures which fluctuated between definite limits, and the mortality was recorded in all experiments.

At a constant temperature larval life of *labranchiae* was 9 days at 30°C., no deaths occurring. At 32° and 35°C. some larvae became pupae, but none of them reached the adult stage, though in nature larvae must be exposed to temperatures at least as high as this for a few hours at a time. Under the same conditions the larval life of *atroparvus* was one day less at each temperature, and again none survived to the adult stage at 35°C. A few minor differences between the races are recorded, but as apparently no experiment was repeated it does not seem necessary to attribute much importance to them.

The paper also describes experiments in which the temperature of the thermostat ranged between two fixed points during the day. For instance, at 20–30°C. the length of life of the larva of *labranchiae* was ten days, the mortality being very slight. The experiments give approximate information about the temperature, whether constant or fluctuating, which is optimum for these larvae. They are valuable because they were carried out with care and fully recorded.

P. A. Buxton.

Polezhaev (V. G.). L'influence de la lumière sur la distribution des *Anopheles maculipennis* dans les abris de jour. [**The Effect of Light on the Distribution of** *A. maculipennis* **in Day-time Shelters.**] —*Med. Parasitol.* Moscow. 1936. Vol. 5. No. 4. pp. 544–548. With 2 figs. [In Russian. French summary.] [Summarized in *Rev. Applied Entom.* Ser. B. 1937. June. Vol. 25. Pt. 6. pp. 142–143.]

"The distribution of *Anopheles maculipennis*, Mg., in day-time shelters was studied in a village in the environs of Perm. Cow-sheds and stables were examined, and in each case the temperature, humidity and intensity of light in the four corners and in the centre were measured. The weather was wet, and, in the sheds and stables, the humidity was high, the mean temperature varied little and there were practically no draughts; the intensity of light was, therefore, the decisive factor that affected the distribution of the mosquitos. They always occurred in the upper parts of the sheds, but were evenly distributed if the light was evenly diffused, whereas if it was not, most of them congregated in dark places, this being due to photokinesis. In some cases, however, this inverse correlation with light intensity was broken owing to the presence of animals to which the mosquitos were attracted, or to cracks in the walls, which they avoided. A table shows how the average numbers of mosquitos decreased regularly with an increase in the intensity of light, which varied from 0·15 to 195 lux."

Gil Collado (J.). La distribución geográfica de las variedades de *Anopheles maculipennis* en España, con breves consideraciones acerca de su biologia. [**Geographical Distribution of** *A. maculipennis* **in Spain.**]—*Riv. di Malariologia.* Sez. I. 1937. Vol. 16. No. 4. pp. 276–289. With 1 map.

The examination of the eggs laid by some four thousand mosquitoes caught in all parts of Spain has enabled the author to map out the distribution of the varieties of *A. maculipennis* that are found in that country. Four varieties are met with: *basilei* (*typicus*), *melanoon*, *labranchiae*, and *atroparvus*. *A. maculipennis* var. *typicus* was found only in one village in the north-west, near the northern frontier of Portugal. The *melanoon* variety was only found near rice fields along the east coast of the country: it is responsible for little or no malaria. The variety *labranchiae* is restricted to the south-east corner of the country where it is an efficient vector of malaria, sometimes in epidemic form. The only widespread variety is *atroparvus*: it is found throughout the country and in very diverse conditions as regards

climate and physical features. It prevails in places of high endemicity and places in which there is no malaria at all. The author discusses at some length the factors which may be responsible for its inefficiency as a vector in certain conditions. *N. W.*

Bates (Marston). **The Seasonal Distribution of Anopheline Mosquitoes in the Vicinity of Tirana, Albania.**—*Riv. di Malariologia.* Sez. I. 1937. Vol. 16. No. 4. pp. 253–264. With 12 figs.

The results of weekly catches of mosquitoes in two stables near Tirana, Albania, during four years, are reported. The *Anopheles* found are *maculipennis* (*typicus* and *subalpinus*), *sacharovi*, *superpictus*, *claviger*, *plumbeus* and *algeriensis*. The last two are rare. The *maculipennis* curve covers the same period each year. There is an increase in the spring; the peak of the curve is at the beginning of July, and thereafter a rapid fall. The curve is of single mode. The big summer increase of *maculipennis* concerns *typicus* only: *subalpinus* prevalence remains at a low and fairly constant level throughout the summer. *A. sacharovi* appears early in July and declines in numbers gradually through August and September. The curves for *superpictus* vary from year to year. The species breeds in pools in the river bed: the floods which come down the river are very irregular. A dry summer favours *superpictus*. There is a tendency for the curve of prevalence to show a low spring peak early in May and a much larger peak in August. The *claviger* curves show a small spring peak and a very abrupt and large rise in the first or second week of November: this was constant. *N. W.*

Feng (Lan-Chou) & Ch'in (Yao-T'ing). **The Presence of *Anopheles maculipennis* in Certain Parts of Manchuria.**—*Chinese Med. Jl.* 1937. Apr. Vol. 51. No. 4. pp. 496–499. With 5 figs. on 1 plate. [12 refs.]

The finding of *A. maculipennis* in Heilungkiang, North Manchuria, is interesting. It is reported in this paper for the first time. The male terminalia of the single specimen available have led the authors to believe that the variety is *atroparvus*. It remains to be seen whether this species or *hyrcanus*, which is also present, is responsible for the high incidence of malaria in certain localities in North Manchuria.

N. W.

Yao (Y. T.) & Ling (L. C.). **Study of Mosquito Fauna in Southwestern China especially in the Provinces of Kweichow and Yunnan. Part I. Tribe Anophelini.**—*Japanese Jl. Experim. Med.* 1937. Apr. 20. Vol. 15. No. 2. pp. 121–136. With 1 map. [33 refs.]

Fifteen species of Anopheles have been found in Yunnan, Kweichow and adjacent parts of Szechuan and Kwangsi. Of these *A. annularis* var. *adiei* and *A. philippinensis*, both of which were found in Yunnan, have not been reported from other parts of China. *N. W.*

Sautet (J.). Contribution à l'étude de l'exophilie de l'*Anopheles maculipennis labranchiae* et de l'*Anopheles sacharovi* dans ses rapports avec la transmission du paludisme. [**Exophilia of *A. maculipennis labranchiae* and *A. sacharovi* and its Relationship to the Transmission of Malaria.**]—*Bull. Soc. Path. Exot.* 1937. May 12. Vol. 30. No. 5. pp. 387–392. With 3 figs.

Exophilia, or preference for an outdoor existence, appears to characterize both *A. maculipennis labranchiae* and *A. elutus* in Corsica in the hot weather, though both species appear to be essentially domestic or entophile elsewhere. Holes in the trunks of cork oak-trees were much favoured as diurnal shelters. Here the numbers greatly exceeded the numbers caught in a nearby stable when the weather was calm ; in windy weather the reverse was noted. The females captured in outdoor resting places were gorged in about the same proportion as those captured in the stable. The author believes that malaria is more commonly contracted in the open air than is commonly supposed.

N. W.

Bevan (C. E.). **Notes on the Distribution and Breeding-Places of Mosquitos in Northern Abyssinia.**—*Bull. Entom. Res.* 1937. July. Vol. 28. Pt. 2. pp. 279–287. With 1 text fig. (map) & 3 figs. on 1 plate.

Conditions inseparable from service with an ambulance in war-time in difficult country are not congenial to research. In four places the ambulance remained long enough to allow mosquitoes to be bred from larvae. Fifty-five such mosquitoes, and six caught as adults, were sent to the Imperial Institute of Entomology and identified by Dr. F. W. Edwards. They included seven species :—*Culex andersoni, Culex theileri, Aëdes quasiunivittatus, Anopheles cinereus, Anopheles christyi, Anopheles garnhami* and *Culex annulioris*. The last four have not previously been recorded from Abyssinia. All the breeding places were from 6,000 to 9,000 feet above sea level. Attached to the report is a list of mosquitoes that have been reported from Abyssinia.

N. W.

Gaschen (H.) & Raynal (J.). Recherches sur les affinités trophiques des anophèles d'Indochine. Deuxième note. *Anopheles vagus, A. minimus, A. jeyporiensis* et *A. aconitus*. [**Feeding Preferences of the Anophelines of Indo-China.**]—*Ann. Inst. Pasteur.* 1937. July. Vol. 59. No. 1. pp. 57–93. With 4 charts & 4 figs. [24 refs.]

The first part of this paper was concerned with *A. sinensis* (this *Bulletin*, 1937, Vol. 34, p. 164). The observations now reported are concerned with *A. vagus, A. minimus, A. jeyporiensis* and *A. aconitus*.

A. vagus is a multidentate species. In the 1,028 examined the number of maxillary teeth varied between 12 and 18, mean 14·1. Comparison with observations in past years indicates that this mean maxillary index in Tonking is stable. Most of the indexes below 14 were found in mosquitoes captured near the sea coast, indicating the possible existence of races adapted to salt water. In no case did precipitin reactions reveal human blood in *A. vagus*, though more than 750 of those examined were caught in human habitations : the species

is thus very definitely zoophile in Indo-China. Buffaloes and bullocks, especially the former, are most favoured as sources of blood.

A. minimus and *A. jeyporiensis*, two of the most important vectors of malaria in Indo-China, are both paucidentate : the mean maxillary index of 494 *A. minimus* was 11·6 (only 1·2 per cent. 14 or over), and of 501 *A. jeyporiensis* 12·0 (3·4 per cent. 14 or over). The index varies very little from place to place. Human blood was found in 59·6 per cent. of *A. minimus* and in 51·2 per cent. of *A. jeyporiensis*. Both species are thus anthropophile. In the absence of human blood both species feed on bullocks and buffaloes, *A. jeyporiensis* being more readily deviated toward these animals than *A. minimus*. The position of stables in agricultural communities in Tonking is of importance in securing this protective deviation.

A. aconitus although paucidentate is to a very marked degree zoophile. The mean maxillary index was found to be 11·2 (501 examined) and 94·2 per cent. contained animal blood as compared with only 2·3 per cent. with human blood. The authors consider that their results are invalidated to some extent by the fact that 422 of the mosquitoes were captured in an agricultural concession where cattle stables are very abundant and where even *minimus* and *jeyporiensis* are deviated towards animals to some extent. Even so its zoophile tendencies are marked, though in some parts of Tonking anthropophile tendencies are sufficiently in evidence to make it a not negligible vector of malaria. *N. W.*

KIRK (J. Balfour). **The Relation of Shade to the Natural Breeding Places of *Anopheles costalis* in Mauritius.**—*Ann. Trop. Med. & Parasit.* 1937. Apr. 8. Vol. 31. No. 1. pp. 1–6. With 1 plate.

Rivers and watercourses in Mauritius are periodically liable to flooding. For this reason ground on either side of watercourses is reserved and exploited by a government River Reserves Board. These reserves have been long kept planted with trees with the primary object of preventing erosion. The belt of shade on each side of the watercourses is also beneficial, inasmuch as *A. gambiae*, Giles (*costalis*, auct.) the principal vector of malaria, does not breed in shaded water in Mauritius. *A. funestus*, which is also prevalent in Mauritius, breeds in densely shaded waters, but fortunately this species plays no important part in the spread of malaria in the Island. *N. W.*

GEBERT (S.). **Notes on the Viability of *Anopheles costalis* Ova subjected to Natural Desiccation.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1937. June 25. Vol. 31. No. 1. pp. 115–117.

How long can the eggs of *Anopheles gambiae* [called by its synonym *costalis* in the title] survive after they are exposed under natural conditions on a surface of concrete or mud which is drained and allowed to become dry ?

In the majority of the experiments eggs were collected in nature and transferred to small concrete basins which were drained and then left in the open for one or more days. They were then refilled with water and a record made of the number of eggs which hatched. It was found that at least a quarter of the eggs could hatch when the basin had been apparently dry for 24–48 hours ; few could hatch after 72 hours, none

after longer exposures. The author points out that it has been the custom in Mauritius to prevent breeding in tanks etc. in gardens by emptying them and refilling them a few hours later, but his experiments indicate that a period of 4 days is necessary if any eggs which may be in the water are to be destroyed. The point is important because the great majority of the breeding places of *A. gambiae* in Mauritius are artificial pools and tanks in gardens. *P. A. Buxton.*

DE MEILLON (Botha). **A Cage Colony of *Anopheles gambiae* Giles.** [Correspondence.]—*Nature.* 1937. Sept. 4. Vol. 140. No. 3540. p. 428.

The author has frequently tried to maintain *A. gambiae* in culture in the laboratory, but has failed, generally because caged adults would not feed either on man or animals. He has now been successful, making use of a large cage heated to about 25°C. and offering the insects a small pig as food. The third laboratory generation had been bred at the time when the note was written. *P. A. Buxton.*

KOSTITCH (D.). *Anopheles* **Mosquitoes in Yugoslavia and their Zoophilism.**—*Ann. Trop. Med. & Parasit.* 1937. Apr. 8. Vol. 31. No. 1. pp. 15–22. [15 refs.]

Five species of *Anopheles* are found in Yugoslavia, *maculipennis, superpictus, bifurcatus, hyrcanus* and *plumbeus. A. maculipennis* is the most important vector of malaria and *superpictus* also plays an important part. The only two varieties of *maculipennis* found are *messeae* and *typicus.* In southern Yugoslavia anophelism without malaria has never been observed and *A. maculipennis* var. *messeae* never exhibits such leanings towards exclusive zoophilism as it does in other parts of Europe. During 1935 precipitin tests were carried out on the stomach contents of 812 anophelines, *viz., maculipennis,* 395 caught in stables, 210 in houses, and *superpictus,* 107 caught in stables, 100 in houses. Of the stable *maculipennis* 15·4 per cent. had fed on human blood, 76·7 on animal blood and 7·9 per cent. on both human and animal blood. Of *maculipennis* caught in houses 45·6 per cent. contained human blood, 40·8 animal blood and 13·6 per cent. both human and animal blood. Of *superpictus* caught in stables 42·9 per cent. contained human blood, 44·7 animal blood and 12·4 per cent. both human and animal blood. Of *superpictus* caught in houses 48·1 per cent. contained human blood, 21·5 animal blood and 34·4 per cent. both human and animal blood [totalling 104 per cent !]. These anophelines have been observed to bite even when their stomachs are distended ; this greediness is thought to explain the large number of anophelines found containing both human and animal blood.

N. W.

POKROVSKI (S. N.) & POLIKARPOVA (L. I.). **The Transportation of Malarial Mosquitoes into Stalingrad and Astrakhan on Local River Steamers.**—*Med. Parasit. & Parasitic Dis.* Moscow. 1937. Vol. 6. No. 2. [In Russian pp. 224–230. With 3 figs. English summary p. 230.]

"Daily collections of mosquitoes on small steamboats and on large steamboats show that these vessels, especially the large ones, transport a considerable number of *Anopheles maculipennis* into the city of Astrakhan

from different parts of the Volga delta. This fact undoubtedly has epidemiological significance.

" The city of Stalingrad also suffers from the same incessant ingress of malarial mosquitoes on steamers from the Volga basin."

Boyd (Mark F.) & Kitchen (S. F.). **A Further Note on the Infectiousness of Anopheline Mosquitoes infected with** *P. vivax* **and** *P. falciparum.*—*Amer. Jl. Trop. Med.* 1937. Mar. Vol. 17. No. 2. pp. 245–251.

The observations recorded in this paper were made in the authors' malaria therapy service and have much epidemiological interest. *P. vivax* is used in the treatment of white patients, *falciparum* in the treatment of negroes : the behaviour of *vivax* and *falciparum* presents interesting points of dissimilarity. Infective mosquitoes were classified as poor, fair and good according to the number of cysts per positive stomach in the different lots, poor having less than 30, good more than 50 in half of them. In the case of *vivax* the percentage of positive takes was 80·8, 84·8 and 92·8 with poor, fair and good lots respectively. With *falciparum* these percentages were 66·6, 61·8 and 44·4. It would appear that, in the case of *falciparum*, if much space on the stomach wall be occupied by cysts the mosquito will not mature as many infectious sporozoites as will a lightly infected mosquito. This is certainly not the case with *vivax*. The likelihood of a successful inoculation with *vivax* in white patients increases with the number of sporozoites inoculated. The minimal infecting dose of *falciparum* sporozoites in negroes is small, less than the number of sporozoites usually inoculated by a single mosquito with an average infection. No patients were infected with *vivax* sporozoites after more than 50 days' storage of the mosquitoes in the frigidaire after the first detection of sporozoites in the salivary glands : in the case of *falciparum* there were no infections after 30 days such storage. The best results were obtained with *vivax* sporozoites less than twenty days old and with *falciparum* sporozoites less than ten days old. *N. W.*

Papadakis (A. M.). **Researches on the Biology of** *A. superpictus* **in Northern Peloponnesus for March to October 1934.**—*Iatr. Athen.* [Med. Athens]. Nos. 89–90. Reprint 22 pp. 1936. Athens. [In Greek.] [Summarized in *Rev. Applied Entom.* Ser. B. 1937. June. Vol. 25. Pt. 6. pp. 147–148.]

" An account is given of an investigation undertaken from March to October 1934, in a town and 16 villages in northern Peloponnesus on the biology of *Anopheles superpictus*, Grassi, which is the chief malaria vector of the region.

The overwintered females oviposited during the first half of April ; the first eggs were found in nature on the 7th, the first young larvae on the 20th, and adults of the first generation at the beginning of May. The average number of eggs in a batch during the whole period was 112, but during the period of greatest egg production (15th June–15th September) it was 128. The numbers of eggs decreased after 15th September, and no oviposition was observed in October. At the beginning of the season the larvae were usually found only in low-lying breeding places, whereas when the weather became warmer they occurred at higher levels. During August and September, they were ubiquitous, but were more prevalent in torrents in the hills than in breeding places on the plain. Larvae from the higher situations

were more resistant than the others to such factors as sun, warmth, etc., and were more active, both in nature and in the laboratory; moreover, they were not so easily or quickly killed when the water was dusted with Paris green. Paris green appears to have rather less effect on larvae of *A. superpictus* than on those of *A. maculipennis*, Mg., and *A. sacharovi*, Favr.

"At the beginning of the season, adults were found in houses and stables in lowland areas, and later in those in higher situations. They were widely distributed in August and September, but became less so in October when the temperature was falling. Observations in a mountainous village, 1,640 ft. above sea level, showed that twice as many females were caught in stables as in houses; they were taken in larger numbers in catching stations when animals or man had been present in them during the previous night. They did not seem to prefer man to animals, and their abundance in buildings appeared to depend on the suitability of the shelter and the accessibility of a blood meal. It was found by means of precipitin tests that 44·7 per cent. of females caught in bedrooms contained human blood and 55·2 per cent. animal blood (horse and sheep), whereas all those in stables contained animal blood. The general malaria infection rate was 1·5 per cent. in September and was a little higher in females taken in stables than in those taken in houses. The inhabitants of certain villages go with their animals to villages in the hills for two or three months during the hottest part of the year (August–September), and catches made in the empty houses and stables revealed only a few Anophelines, although it is the season during which they are most prevalent. Far larger numbers were obtained when the inhabitants returned, although the temperature was beginning to fall (pre-hibernating period). Undoubtedly the presence of man and animals attracts the mosquitos to a great extent. In villages in high situations *A. superpictus* was only prevalent for two months, whereas in those on the plains or near the sea it was abundant for four. Although several catching stations of the same type were placed along the bank of a large torrent, in only one were males of *A. superpictus* found in large numbers throughout the season. In this one, the proportion of males to females was 5 : 1; when pigs were kept there overnight, the total number of mosquitoes was increased but males still predominated. This station appeared to be similar to the others and was at the same distance from the breeding places."

PAPADAKIS (A. M.). **The Biology of *Anopheles superpictus* in Greece.**—*Hellen. Iatr.* [Greek Med.] Vol. 10. Reprint 9 pp. 1936. Salonica. [In Greek.] [Summarized in *Rev. Applied Entom.* Ser. B. 1937. June. Vol. 25. Pt. 6. p. 148.]

"From observations over a period of five years in different parts of Greece, the author concludes that the breeding places of *Anopheles superpictus*, Grassi, can be divided into three main types, chiefly according to soil conditions. The first type occurs in torrents and is characterised by having a rocky bottom on which there may or may not be vegetation; it is small and shallow with very clear water, and is exposed to the sun, although it may be partly shaded for a few hours. The second type occurs in the beds of large rivers and is characterised by having a sandy bottom; the water, which is clear, may be shallow or rather deep, but is exposed to the sun throughout the day. Almost

always there is a thin layer or film of sand or dust floating on the surface. The third type occurs in streams or small torrents, chiefly on hill sides, and is characterised by a thick layer of mud on the bottom ; the water is very shallow and the vegetation, if any, is on the edges. The first type is the most common, but the least favourable to the larvae ; the second type is the most favourable. The observations were verified in several hundred experimental breeding places made next to natural ones.

" Observations have also been made on oviposition in nature and in experimental breeding places in the open, and on larval development. The eggs were counted on the surface of the water by means of a hand lens without disturbing the breeding place. In the first and third types of breeding places, the eggs were always found at the edges, particularly where the surface of the water touched the soil. In the second type, they were laid on the layer of dust or sand in the middle of the water surface, rarely at the edges. In the last-named type, eggs were never found if the layer of dust or sand was absent ; moreover, the layer must be thin, for no oviposition took place where it was thick. In the rare cases where the breeding places contained vegetation, the eggs were never deposited on it.

" Thus the breeding places of *A. superpictus* appear to be small (in comparison with those of the other Anophelines of Greece), shallow, and exposed to the sun for most of the day, and the water is clear and not cold. In those of the second type, there is also a layer of dust. The fact that this species is prevalent in Greece in the warm months (July-September) would appear to show that it is favoured by sun and abundant daylight, and it is suggested that it chooses small, shallow, sunlit collections of water for breeding because the water in them is uniformly warm. Its eggs, which have no floats, sink easily, and this is thought to be the reason why they are laid either at the edges of the breeding places or on the layers of dust."

Hu (Stephen M. K.) & Yu (H.). **Further Studies on the Blood Preferences of *Anopheles hyrcanus* var. *sinensis* Wied. in Shanghai Region.**—*Chinese Med. Jl.* 1937. May. Vol. 51. No. 5. pp. 639–642.

It has previously been shown that practically all *A. sinensis* in the Shanghai region captured in houses had fed on human blood and those captured in a cow stable had fed on cow's blood. The present communication describes experiments in which two lots of 318 and 203 *A. sinensis* captured in houses were given an equal opportunity, after four or five days' fasting, of feeding on man or a variety of domestic animals. They showed a marked preference for domestic animals, more especially the cow and the goat. Only 6·9 and 8·2 per cent. of the 306 and 182 Anopheles that had fed were found to contain human blood. *N. W.*

Chang (T. L.). **Maxillary Teeth of *Anopheles hyrcanus* var. *sinensis* Wiedemann in Relation to Blood Preferences.**—*Lingnan Sci. Jl.* 1937. July 22. Vol. 16. No. 3. pp. 435–438.

A. sinensis found in houses in the Kao-chiao area frequently contains human blood : it is nevertheless multidentate. The maxillary index of those found engorged with human blood, 16·7, was not significantly different from that of those engorged with animal blood. *N. W.*

Williamson (K. B.) & Zain (Mahomed). **A Presumptive Culicine Host of the Human Malaria Parasites.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1937. June 25. Vol. 31. No. 1. pp. 111–114. [14 refs.]

The conception that host efficiency is dependent upon environmentally determined biochemical factors led the authors to study the potentialities of *Culex bitaeniorhynchus* as a carrier of malaria. This culicine breeds in pure water: its larvae are always found among *Spirogyra* on which they feed. Thirty laboratory-bred females were fed upon patients whose blood contained from 2·3 to 10·3 infective gametocytes per 100 leucocytes. Plasmodial cysts were found in 14; of the 29 cysts found 18 were pigmented. Eight of the 14 culicines with cysts had sporozoites in the salivary glands. Ross's black spores were found in five. Thirty-one unblooded laboratory-bred females used as controls showed nothing similar: in some of them, however, sporozoite-like bodies were observed on the hind-guts, probably indicative of generalized protozoal infestations of tropical mosquitoes. The authors conclude that the developmental cycle of the two common malaria parasites, and probably that of the quartan parasite also, can proceed to completion in *C. bitaeniorhynchus*, but, in the absence of proof of the transmission of malaria by it, no epidemiological conclusion is at present warranted. *N. W.*

King (W. V.). On the Distribution of *Anopheles albimanus* and its Occurrence in the United States.—*Southern Med. Jl.* 1937. Sept. Vol. 30. No. 9. pp. 943–945. [16 refs.]

i. Covell (G.). **Anti-Mosquito Measures with Special Reference to India.**—*Health Bull. No. 11. Malaria Bureau No. 3.* pp. ii + 60. Fourth Edition. 1935. Delhi: Manager of Publications. [*As.* 4 or 5*d.*]

ii. ——. **The Distribution of Anopheline Mosquitoes in India.**—*Health Bull. No. 17. Malaria Bureau No. 8.* 43 pp. With 1 key map. Second Edition revised and brought up to date by I. M. Puri. 1936. Delhi: Manager of Publications. [*As.* 6 or 8*d.*]

i. The exhaustion of the third edition (this *Bulletin*, 1935, Vol. 32, p. 441) of an extremely useful and practical pamphlet, has afforded an opportunity of bringing the text up to date, without appreciably increasing the size of a brochure which, as was stated when reviewing the previous edition, "should be in the hands of every sanitarian in the tropics." From all conceivable standpoints, those engaged in anti-mosquito campaigns, or in the protection of others from mosquito attack, will find the possession of this excellent booklet well worth while.

ii. The first edition of this publication (see this *Bulletin*, 1932, Vol. 29, p. 478), of which the value is indicated by the title, gave the recorded distribution of Anopheline mosquitoes in India, Burma and Ceylon as known about the end of 1930. Since then, knowledge of the distribution of different species has been considerably amplified, and the information furnished in the edition under review reflects the state of the matter at the close of 1935. *E. E. Austen.*

GORE (Ramkrishna N.). **An Improved Feather-Duster Mosquito Trap.**—*Records of the Malaria Survey of India.* 1937. June–Sept. Vol. 7. Nos. 2 & 3. pp. 209–211. With 6 figs.

The author has found a feather-duster of any dark shade, inserted in an empty kerosene oil tin from which the top has been removed, to be an efficient mosquito trap. He describes his method of using this simple contrivance. *N. W.*

PLAGUE.

PICKEN (Ralph M. F.). **Plague as a Notifiable Disease.** [Correspondence.]—*Med. Officer.* 1937. Nov. 27. Vol. 58. No. 22. pp. 231–232.

The distinction which arises in this correspondence seems to be that between a disease which is legally notifiable and one which should be notifiable but is not. Up to the present plague has not been notifiable and is not yet " notifiable " under the act of 1936 " except by resolution and order of a local authority, with the Minister's approval." It would appear, however, that the Minister is in possession of power of initiative to add to the " notifiable " diseases and that this power could be applied to such diseases as plague, cerebrospinal fever and acute poliomyelitis. *W. F. Harvey.*

BOMBAY: REPORT OF THE HAFFKINE INSTITUTE FOR THE YEAR 1936 [SOKHEY (S. S.), Director]. [**Plague** pp. 31–45.]

Abundant facilities are available in the Haffkine Institute for testing the efficacy of plague vaccines and sera upon large numbers of animals. Dosage has been standardized both in respect of the quantity and the virulence of the organisms used. In this series of trials the subjects studied were :—The relative protective power of broth vaccines and agar vaccines incubated at 27°C. as compared with those incubated at 37°C. ; the efficacy of live avirulent broth and agar vaccines as compared with heat-killed broth and agar vaccines ; effect of the method of killing of cultures on the potency of the resultant vaccine ; effect of storage on the potency of live avirulent vaccines ; growth of *Past. pestis* at different temperatures of incubation and its possible relationship to the start and end of epidemics during certain seasons ; immunization of different laboratory animals with heat-killed plague vaccines ; antiplague serum.

These are all practical matters and the conclusions drawn are of great significance. We shall record mainly the conclusions :—(1) Broth vaccines incubated at 27°C. were found to be more potent than those incubated at 37°C. This fact emerges from the minimum mouse protective doses of three different vaccines—0·002, 0·002, 0·002 cc. respectively at 27°C. and 0·004, 0·015, 0·004 cc. at 37°C. (2) Although agar grown vaccines incubated at 37°C. are more potent than those incubated at 27°C.—doses of 0·002 cc. and 0·004 cc. as compared with 0·1 cc. and 0·1 cc.—SOKHEY does not believe that the difference between them is due to the presence or absence of a capsule. Rather is it a question of the bulk of the organism. The organisms grown at 37°C. are bigger, and thus the actual bulk of 37°C. agar vaccine, if the number of organisms is the same, is greater than the 27°C. vaccine. This factor of size is, however, probably not the only factor. (3) " Broth grown heat-killed vaccines from virulent cultures at 27°C. are superior to live avirulent vaccine grown either at 27°C., or at 37°C." The reasons adduced for the poor protective powers of broth vaccines at 37°C. is that the growth of *Past. pestis* at 37°C. is much less than at 27°C. (4) " In the case of broth vaccines, heat-killed vaccine incubated at 27°C. proved to be the most potent and the live avirulent vaccine incubated at 37°C. the least potent. In the case of the agar vaccines made from exactly the same strains, live avirulent

vaccines incubated at 37°C. proved to be the most potent and heat-killed vaccine incubated at 27°C. the least potent." (5) The method of killing in the case of vaccines grown at 37°C.–55°C. for 15 min., 60°C. for 60 min., phenol, formalin—does not seem to make any difference to the potency. It is otherwise with vaccines grown at 27°C., where killing at 60°C. for 1 hour gives a very much less potent vaccine than that killed at 55°C. for 15 minutes. The reason for this is being studied further: it may have an explanation in the coagulability of the soluble antigenic protein and in its readiness to break up into simpler form. (6) The practice of the laboratory has been to store all vaccines under test at 4°C. Heat-killed vaccines show no measurable loss of potency for months. Live avirulent agar grown vaccines, on the other hand, "deteriorate very rapidly, so rapidly indeed that . . . they could not be issued . . . from a central laboratory, for use in a big country like India."

These are the most important positive findings recorded in the report, so far as relates to plague vaccine. *W. F. H.*

Scott (W. Wilkie). **Activities of the Witwatersrand Plague Committee since its Inception.**—*Public Health.* Johannesburg. 1936. Dec. Vol. 2. No. 1. pp. 3–5, 7–12.

A detailed account of the activities of the Witwatersrand Plague Committee is given by its chairman. This committee, only recently formed, consists of the Medical Officers of Health and the chief Health Inspectors of the Reef Municipalities, with their population of approximately 332,014 Europeans and 443,104 non-Europeans. The methods employed were essentially those of rodent destruction and consisted of:—"(1) Gassing when burrows are in the vicinity of dwellings and on farms to avoid the possible poisoning of livestock. (2) Poisoned grain in open areas. (3) The use of traps on premises where foodstuffs are stored." Success attended the efforts made and "the entire Reef from Nigel, in the East, to Randfontein, in the West, has been entirely free from the dreaded formidable disease of plague."

W. F. H.

Meyer (K. F.). **The Sylvatic Plague Committee.**—*Amer. Jl. Public Health.* 1937. Aug. Vol. 27. No. 8. pp. 777–785.

The whole subject of sylvatic plague is receiving more and more attention. A special committee in America with the designation "Sylvatic Plague Committee" is publishing its reports on the information collected by it. In this report several interesting subjects are dealt with and some commentary made. A somewhat detailed examination is given to cases of proved human plague, which were recovered from. Four of the five cases had direct contact with squirrels and other rodents, but "the histories fail to report flea bites." A recommendation is put forward that the public should "be warned not to handle sick or dead rodents in the regions in which sylvatic plague has been recognized." Care should, however, be taken in wording such warnings, that no harm should be done to summer resorts. A list of rodents that suffer from spontaneous plague is given. It includes various squirrels, a marmot, a chipmunk and prairie dog, all belonging to the *Sciuridae*, and a number of mouse and rat species.

The mode of diagnosis of prevalence of plague among wild animals by the large-pool flea method is worth noting. "The fleas, which

have been killed with chloroform, were combed from the cadavers of the wild rodents. They were transferred to physiological salt solution (in summer a 3 per cent. salt solution is preferable in order to suppress bacterial growth) and shipped to the laboratory. As a rule, they were washed in sterile salt solution then ground in a mortar. The suspensions were injected subcutaneously into guinea pigs." Nothing very much seems to be known of the ability of different species of fleas caught on wild rodents to transmit plague to man. Their rôle in this type of transmission seems to be a subordinate one.

W. F. H.

LAIFLE (Franz Xaver). Die Pest in Wien 1679. [**Plague in Vienna in 1679.**]—*Arch. f. Hyg. u. Bakt.* 1937. Oct. Vol. 119. No. 1. pp. 42–60. [20 refs.]

An account of one of the visitations of plague in olden days is always interesting for the side-light it throws upon the enormous change for the better in living conditions which has taken place with the passing of time. Vienna, situated upon the great Danubian highway from east to west, was for centuries a home of plague and the disease came to be known as the "Viennese death." Nor is there any wonder that a city of such size and importance, subject to the appalling insanitary conditions of the time, should have been periodically and constantly ravaged by disease. The street or roadway was the receptacle of all food and industrial garbage, nor was this refuse swiftly removed. Paving and sewers were, of course, non-existent. Personal hygiene, too, was very indifferent. Dr. Paul v. SORBAIT, who was physician to the Empress and medical head of the sanitary service, asks in his "Consilium Medicum" "Why do more poor people die than rich?" and gave as his answer: "Because poor people are much less cleanly and because the rich can change their clothes much oftener."

As is sometimes the case when plague assumes epidemic form, the fact is not immediately recognized. At all events the authorities did not, in 1679, take active steps to prevent the congregation of the people. We read of how on the 22nd March there came to Vienna a Tartar embassy; on the 14th June the Papal ambassador made his entry with 50 six-horse carriages; a few days later the Russian ambassador rode in with 200 persons. and a month later still the Polish ambassador, Prince Radziwil, with an innumerable following. The people collected in crowds to see, in spite of the royal decree stringently prohibiting such gatherings in streets or buildings. Ultimately the nature of the disease became apparent and the word "Plague" rang throughout the town. A flight of the population set in and the town became deserted. People built themselves houses of wood outside city limits or even took to the forest along with wild animals. The well known tale of plague is re-described, where the dead accumulated for want of vehicles for removal or from want of sufficient gravediggers. Criminals were set free from prisons to perform the task. Some observations are made as to the distribution of plague. Women provided more victims than men, a fact which is put down to the necessity for them to go about to get food, their attendance at church and their occupation as nurses of the sick. Clergymen also showed a high mortality, easily accounted for by contraction of infection at the sick bed in the course of their duties. Curiously enough, plague doctors did not show this high incidence, as only

6 out of 28 died. This was probably due to their knowledge of how to avoid infection and to their remaining at a safe distance from their patients. The author of the articles has sympathy with Dr. Sorbait, the chief medical personage in the epidemic, when he hails him as a proponent of the idea that only a doctor can preside over a health department. Little doubt seems to exist that the epidemic was truly plague and not typhus nor smallpox. There does, however, seem to be some current evidence that typhus did contribute something to the heavy mortality. This epidemic resembled in all respects serious plague epidemics elsewhere, such as those of London. Tales of the occurrence of plague, simultaneously with human plague, among birds, dogs and cats, are of doubtful validity. It was a summer epidemic and bubonic, not pneumonic. *W. F. H.*

Taylor (J.). **Rural Plague in India.**—*League of Nations. Health Organisation. Intergovernmental Conference of Far-Eastern Countries on Rural Hygiene. Preparatory Papers relating to British India.* Ser. L.o.N.P. 1937. III. 6. pp. 81–92.

Within a short compass a very good review is given by the author of the position of plague in India at the present day and the methods employed in combating it. "Plague . . . does not now present the problem which it did in the earlier years of the pandemic." The approximate yearly average of deaths has been 1898–1918, 500,000; 1921–1930, 100,000; 1931–1935, 50,000. Plague "does not now form a major preoccupation of the Public Health Departments of most provinces. Its importance is less than that of other epidemic diseases such as cholera and smallpox." The reduction in plague incidence may be due to the establishment of a degree of immunity in the rat population, which has been found actually by experiment to exist. The immunity is roughly proportionate to the prevalence of plague in the areas from which the test rats have been obtained.

In some countries plague pneumonia is a dreaded disease, but in India plague is and has been essentially bubonic. This form is always due to flea infection from plague rats. As "the habits of the people in India do not allow of any degree of human flea infestation" the direct spread of plague from man to man is not a factor in India.

Sylvatic plague, which is so important a problem in many other countries does not seem to obtrude itself to any extent in India. *R. rattus*, universally distributed, is a domestic rat, while *R. norvegicus* is essentially the rat of the seaports and not of the countryside. Field rats, in fact, "do not exist in the large numbers in which they are found in many other countries." Rural plague in India therefore is due to an *R. rattus* house epizootic. Of the three flea transmitters in India *X. cheopis* is the chief, *X. brasiliensis* may be important in the Deccan and *X. astia* is negligible as a direct vector. Where *X. astia* is prevalent, *X. cheopis* is correspondingly scarce and plague is rare. Climatic factors vary greatly in different parts of India. These work probably chiefly "through their effect on (a) total flea-prevalence, (b) length of life of the flea, and (c) the production of Bacot's 'blocking' phenomenon in relation to these." It has been recently shown that the climatic conditions in rat burrows underground may differ considerably from those above ground and that this may account for the fact that plague, in mild epizootic form, does not die out in the hot weather.

Preventive measures may be divided into those of a permanent and a temporary nature. Except for the building of rat-proof grain stores in large towns or in smaller towns extensively engaged in the grain trade, permanent antiplague measures have not been adopted to any extent, as they are not suitable to Indian conditions. As temporary measures may be cited: (1) inoculation with vaccine, (2) evacuation, (3) rat destruction, (4) disinfection, (5) control of grain traffic in infected areas. Continuous work has been carried out on the improvement of plague vaccine and experimentally "it appears that the vaccine will now confer protection in a dose of one-thirtieth of that formerly required." Field trials are to be made of the vaccine "under conditions in which statistical control will be possible, in order to assess more exactly its true value."

Of commonly applied rat destruction methods trapping has been found to be only of limited value and cannot have a permanent effect. Poison baiting may be more easily carried out and the formula given is: one pound of barium carbonate, 3 lb. flour from local grain made into a paste and divided into about 2,400 pills containing about 3 grains each. It is necessary to make the bait fresh daily. Instead of poison baits, cyanide gas fumigation is becoming increasingly popular and has yielded highly successful results as a preventive measure when carried out by expert gangs. *W. F. H.*

Sokhey (S. S.) & Chitre (G. D.). L'immunité des rats sauvages de l'Inde vis-à-vis de la peste. [**Immunity to Plague of Wild Rats in India.**]—*Bull. Office Internat. d'Hyg. Publique.* 1937. Oct. Vol. 29. No. 10. pp. 2093–2096.

By elaborating a technique of standardization of number and virulence of the bacilli to a test dose the authors have been able to perform important comparative experiments. Towns and cities in the different provinces of India show very different mortality rates for plague. The present experiments were designed to work out the correlation between mortality rates in the human population and degree of susceptibility of the rat in the places affected. For this purpose 80 black rats were obtained from each of a number of towns graded as showing high, medium and low plague mortality rates. An interesting and very varied result emerged, for the percentages of deaths from plague in the infected test rats ranged from nil up to 93 per cent. The percentage deaths in the several series worked out, on the whole, as inversely proportional to the human mortality. Thus, Nasik City with a plague rate of 363·43 per mille furnished rats none of which died in the experiment, whereas Madras city with only 0·396 deaths per mille gave a rat death-rate of 91·1 per cent. The cause for this immunity of certain rats does not seem to be due to the continuance among the rat population of a benign epizootic. Thus in Bombay City where some 2,000 rats are caught every night and brought to the laboratory for examination, not a single rat has shown evidence of plague infection during the last two years. Bombay has a human mortality of 199·88 per mille and its rats are known to be highly immune (7·9 per cent. only) as compared with the rats of Madras City. Nor does it seem as if immunity to plague was a matter of hereditary transmission. Mice bred in the laboratory showed no natural immunity to plague and when these mice were infected with plague and survived the infection, their progeny showed no sign of

any hereditary immunity. The authors favour the view that different degrees of susceptibility to plague are to be found among different races of *Rattus rattus* and that in any given locality the very susceptible races tend to die out, leaving a higher proportion of rats which are naturally resistant. *W. F. H.*

Malta. Annual Report on the Health of the Maltese Islands for the Year 1936. Appendix A. pp. xxix + xlviii. **Report on Plague in Malta in 1936** [Bernard (A. V.), Chief Govt. Med. Officer].

A characteristic outbreak of human plague is here reported. During 1936 a total of 28 probable cases with 11 deaths occurred between March and November. The very first case had not given positive bacteriological results, but is included on the evidence of connexion with other cases.

It was not long after the discovery of the first three cases that the evidence of a rat epizootic was also brought to light. Infection of these human cases was traced to a stable where the rats were found to be plague infected. One of the most interesting observations in regard to this epidemic is set out in the following remarks:—"Consideration of all the circumstances . . . lead strongly to the belief that the infection was introduced into the island . . . from North African countries where rodent plague is endemic. Large quantities of hay and straw in compressed bales had for some time past been imported from these countries and these may have contained infected rats or fleas from which our rodent population in its turn became infected. In many instances cases occurred in stables, goatpens, etc., where this hay and straw was being largely made use of. It is also possible that some of the patients may have been infected directly while opening out these bales." Among the animals found plague infected, besides rats, were a cat and a guineapig. In Malta the predominant rat is the brown rat *R. norvegicus* and not *R. rattus*, and it was the brown rat which was definitely found infected with plague. Whereas the rat concerned in the epizootic seems to have been that with its habitat in temperate climates, it was otherwise with the fleas. A survey showed preponderance of the mouse flea (*Leptopsylla musculi*) and the tropical rat-flea (*Xenopsylla cheopis*) over the rat-flea of temperate climates (*Nosopsyllus fasciatus*). It became evident from the evidence collected that the epizootic in Malta "was being maintained through the large numbers of rats bred and harboured in the heaps of refuse collected and kept for composting into manure." Large scale measures of prophylaxis are obviously necessary and two in particular:—(1) a systematic anti-rat campaign and (2) "a proper service for the collection of house refuse and suitable control of the methods of disposal of all refuse, both that collected from the houses and from the streets." The Government has already instituted the first of these. It is very interesting to hear of the enlistment of the co-operation of newspapers and the clergy of the islands and also the utilization of broadcasts on the wireless explaining the measures that are called for in the circumstances. Unfortunately a fresh outbreak of plague has been reported in the first few months of 1937 after a lapse of six weeks from the last case reported in 1936. Many individual accounts are attached to the chief Government Medical Officer's

report. Reference, too, should be made to the instructive historical account of plague in the Mediterranean countries with which the report is prefaced. *W. F. H.*

SOREL. Sur le comportement de l'endémie pesteuse dans les colonies françaises, particulièrement au cours des deux dernières années. [**Endemic Plague in the French Colonies during the Last Two Years.**]—*Bull. Office Internat. d'Hyg. Publique.* 1937. Oct. Vol. 29. No. 10. pp. 2071–2092. With 1 chart.

This survey relates to the French colonies of East Africa, Madagascar' and Indo-China.

In West Africa (Senegal and Dakar) plague has varied considerably in its incidence, from about 2,000 yearly between 1928 and 1930 to 200 in 1932 and 1933, with a rebound to 1,100 in 1934. It has been almost entirely bubonic with only about 10 per cent. primary pneumonic plague. In Madagascar, however, pneumonic plague, especially on the high plateaus, plays a very important rôle. The history of plague in Madagascar has been that it remained a coast disease and bubonic from 1898 to 1921. In that last year it appeared in Tamatave, bubonic to begin with, and then presented itself in the district of Antananarivo as pneumonic plague, where in 3 months 46 persons died of it. During the 15 years after 1921 plague made further progress. It is established now endemically and epidemically over the whole of the high plateaus, is dominantly pulmonary and capable of giving rise to grave epidemics of this character. A seasonal prevalence of pneumonic plague is apparent, which is related to the cold weather, with maximum in August and September. What is striking in the epidemiology of plague in Madagascar is its appearance as a sporadic affection ; isolated cases occur, having no relation to one another and then the disease manifests itself as small epidemics affecting the family or the village. No doubt seems to exist that the rat and the flea are the means of dissemination of plague, but it is also contended that man himself must be reckoned as a vector agency, either by direct infection in pulmonary cases or indirect by his transportation of infected fleas in baggage or merchandise. Nevertheless it has been noted that an imported case has never become a focus of plague, so long as the rat population has remained unaffected.

Plague in Indo-China seems to be decreasing : the record is one of descent from 1,300 cases in 1922 to 40 in 1936.

Rats in Madagascar are of the species *Rattus rattus* or black rat, *R. alexandrinus*, which has a grey abdomen, and *R. frugivorus*, which, on its ventral aspect, is partially pure white or sulphur yellow. The localization of epizootics and their disappearance, which is characteristic of the high plateau is doubtless attributable to the habits of *Rattus rattus*, which seldom leaves its customary haunts, and also to some extent to the configuration of the country, with its sparsely populated villages, its transport of merchandise by human agency, etc. : these do not favour the displacement to a distance of the rat population. The main plague flea is *Xenopsylla cheopis*. *Ctenocephalus felis*, *P. irritans* and *Nosopsyllus fasciatus* are either rare fleas or of no account. This appears also to be the case for *Leptopsylla musculi* and *Echidnophaga gallinacea*.

The methods adopted for antiplague campaigns are much the same as those elsewhere. The interesting statement is made that only

one method is efficacious—in Madagascar at least—for the check of pulmonary plague. It is to isolate all the individuals (family, friends and neighbours) who have been exposed to infection. Masks and spectacles must be worn. A regular inspection of these individuals, morning and evening, ensures early diagnosis of the new case. The experience of fifteen years has shown the absolute efficacy of this method. Rat destruction has had little effect upon the total rat population and is not regarded highly as an antiplague measure. In Madagascar it was calculated that it cost about 1½ francs to capture one rat. It is little use to recommend cats for the extermination of rats, for the native of the island regards cat meat as a table delicacy.

Different types of plague vaccination have been adopted in different colonies, broadly speaking dead vaccines and living vaccines. In Indo-China the vaccine (dead) of the Pasteur Institute is used. In West Africa a lipovaccine and an aqueous vaccine of the Pasteur Institute (P.S.T.) are favoured, while in Madagascar reliance is placed upon vaccine from a living avirulent strain (E.V.) of the plague bacillus. It would appear that the clinical attack of plague is just as severe in the vaccinated as in the unvaccinated, so far as relates to killed vaccine, and evidently a preference is expressed by the author for the living vaccine. As for specific treatment, this is restricted to the use of serum and of bacteriophage. "The action of bacteriophage, manifest *in vitro*, is more difficult to appreciate clinically. Whether the lytic principle be injected intravenously, subcutaneously or directly into the bubo, the results do not appear to be greatly different from those obtained by serotherapy alone." *W. F. H.*

GIRARD (G.). Quelques aspects de l'épidémiologie et de la prophylaxie de la peste sur les hauts-plateaux de Madagascar. [**Epidemiology and Prophylaxis of Plague in the High Plateaus of Madagascar.**]—*Rev. d'Hyg. et de Méd. Préventive.* 1937. Oct.–Nov. Vol. 59. No. 8–9. pp. 543–554. [14 refs.]

This article is introduced by the sentence:—"Of all the active foci of plague that of Madagascar has been for 15 years one of the most important in the world." This statement may perhaps be justified on three grounds: (1) the frequency of pneumonic plague, (2) the contention that the plague cycle is not necessarily rat-flea-man, but may be man-flea-rat, and (3) the use of a living avirulent plague organism for prophylactic vaccination.

The dominance of pneumonic plague in the high plateaus of Madagascar is attributed simply to temperature conditions. A low temperature, frequently below 14°C., is normal on the plateaus, but is non-existent at the coast. There is, moreover, no reason to suppose that the organism of Madagascar has any special pneumotropic character. It is, however, a virulent type of organism and there is no sign of any diminution of severity even of bubonic cases. So-called "septicaemic" plague, which probably only represents cases with inconspicuous buboes, is common. No doubt exists as to the reservoir of the virus in Madagascar. It is the rat—*R. rattus* and *R. alexandrinus*. The plague flea concerned is *Xenopsylla cheopis*. *R. rattus* is a climber and is found in the roof as well as the floor of a house. No *R. decumanus* is found in Madagascar and *R. rattus* therefore is also a sewer rat.

In the epidemiology of plague upon the island the flea is a very important factor. It can remain infective for several weeks after

rats have disappeared and will thereafter obtain its meal of blood from man. In this way plague transmission may be effected to a distance from the original focus by carriage thither of still infective fleas. Again, the young fleas, which are developed in the paddy, rice dust of the Malagassy huts, by the hundred, may have to obtain their first meal of blood from man. If this occurs during the septicaemic phase of plague they will become infected and in due course infect rats. This is the basis then of a reversal of the usual cycle, which now becomes man-flea-rat.

Great difficulty arises over true reporting of plague cases in the backward indigenous population and it is a fact that 95 per cent. of plague cases only become known after the death of the individual. Most effective post-mortem methods of diagnosis (this *Bulletin*, 1937, Vol. 34, p. 789) have been developed in Madagascar, which to a large extent supply the place of notification and permit of early isolation of contacts. This diagnosis is based on examination of lung and liver puncture material obtained from the cadaver. A period of 10 days' isolation is regarded as indispensable for contacts, seeing that pneumonic plague may have an incubation period of 6, 7 and even 9 days.

Vaccination with living organisms has been extensively employed in the prophylaxis of plague in Madagascar. The avirulent strain of plague bacillus, known as the E.V. strain (this *Bulletin*, 1937, Vol. 34, pp. 408–9), is used and figures of mortality from plague since the vaccine has been officially authorized give encouragement to its continuance.

The total deaths from plague in 1934–35, 1935–36 and 1936–37 were 3,606, 3,035 and 1,376 respectively. *W. F. H.*

Robic (J.). Les caractéristiques de la peste à Madagascar. [**Plague in Madagascar.**]—*Ann. de Méd. et de Pharm. Colon.* 1937. Apr.–May–June. Vol. 35. No. 2. pp. 305–358. With 1 graph.

Plague was introduced into Madagascar in 1898 from an Indian rice steamer. It prevails now over the whole of the High Plateau in endemic form and there has been no intermission in its incidence. Moreover the plague of this region has been very frequently pneumonic. In all its three forms of appearance, pneumonic, bubonic and septicaemic, it still remains essentially rat plague, where man is secondarily infected. Pneumonic plague is, of course, very infective and transmissible directly from man to man. The tendency to a pulmonary localization seems to be climatic and related to cold weather conditions. Direct contagion cases occur when the atmospheric temperature does not exceed 15°C. and, when such temperatures prevail in the High Plateau, pulmonary cases may exceed the bubonic. Seasonal conditions also have an important bearing on the prevalence of plague. These affect the vitality and rate of multiplication of *X. cheopis*, which is the chief insect vector of plague.

The epidemiology of plague in Madagascar is characterized by the frequency of its sporadic development in isolated cases with no apparent relation either in time or space to one another, its very definite seasonal recrudescences and by the appearance of small family or village epidemics. No such person as a healthy carrier has ever been met with.

Under the notes relating to methods used successfully for limiting and suppressing foci of plague the author makes reference to the one and only procedure applicable to pulmonary plague. It is isolation in quarantine of all persons who have been exposed to infection. Each person is required to wear a mask of gauze and spectacles. Medical visits to those isolated are made night and morning and temperatures are taken. Such measures serve for the immediate discovery of any one at the outset of an attack and he is immediately removed for treatment. For plague in general, vaccination is the sheet anchor and is repeated as often as is necessary. Huge vaccination campaigns have been carried out.

The rats concerned in plague are *Rattus rattus*, *Rattus alexandrinus* and *Rattus frugivorus*. Sylvatic plague seems to be of doubtful occurrence and little importance. The plague flea is *X. cheopis*. It is a striking fact that the fleas which attack the visitor to native houses in enormous numbers are *Pulex irritans* and *Ctenocephalus canis* or *felis*. This does not mean, as was once thought, that *X. cheopis* does not exist in the free state. It can be found in abundance, if searched for, in the débris from the pounding of rice.

Vaccination against plague is extensively carried out and the vaccine used is a living vaccine of the "EV" avirulent strain. In 1934 there were vaccinated 46,879 persons with mortality from plague of 0·47 per cent. and a mortality from all diseases of 4·08 per cent. These figures are contrasted with the 1·66 per cent. and 9·7 per cent. respectively of a control series of 60,000. Treatment of pulmonary plague has been ineffective. Bubonic plague has been mainly treated by serotherapy and in some cases—with much the same result—by bacteriophage. *W. F. H.*

Wassilieff (A.). La peste murine en Tunisie. [**Rat Plague in Tunis.**] —*Bull. Office Internat. d'Hyg. Publique.* 1937. Oct. Vol. 29. No. 10. pp. 2097–2105. With 1 folding map.

This communication deals with both urban and rural plague, of which the latter is the more generally interesting. In the rural zone, that is to say the interior of the Regency, there has been neither an epizootic nor an epidemic during the past five years. Manifestly it is desirable to maintain this satisfactory state of affairs. Three ways in which contamination may enter the Bled region are suggested: (1) by the wild rodents of neighbouring countries, (2) by sick human beings, (3) by the contact of wild rodents with urban rodents. All the Tunisian rodents are susceptible to plague, some (*Psammomys*) greatly, others (*Merions*) less. *Psammomys* is the rodent of the South; the *Merions* occupy the Centre and the North. The second method of penetration is conceived to be from the plague patient to the wild rodent. But the human flea does not transfer its attention to any extent to the rodent and it is not easy to imagine that sylvatic plague will be originated thus in Tunis. That may be so for the scantily populated Tunisian Bled, but the state of affairs is very different in the environs of towns. Here contact is established between wild and urban rodents. The greatest danger of sylvatic plague would then appear to be from the zone in close proximity to towns. It is to this zone that attention has to be paid, by careful investigation of the area and the periodic destruction of the rodents which occupy burrows close to human habitation. *W. F. H.*

DE ARAUJO (Eduardo). Gatos e peste bubónica. [**Cats and Bubonic Plague.**]—*Hospital.* Rio de Janeiro. 1937. Nov. Vol. 12. No. 5. pp. 769–773.

Cats are susceptible experimentally to plague by cutaneous (with scarification), subcutaneous and conjunctival (with or without scarification) inoculation. It was not found possible to infect cats by feeding them with plague spleen and it would seem that natural plague could only be contracted by them through food, if trauma of the mouth or intestinal mucosa took place. *W. F. H.*

PUBLIC HEALTH REPORTS. 1937. June 4. Vol. 52. No. 23. pp. 748–749. **Plague Infection found in Fleas and Lice taken from Ground Squirrels in Washington State.**

This report presents " the first positive evidence that plague exists among wild rodents in the State of Washington." It is the most northern point in the United States in which wild-rodent plague has been found. As in many previous cases the proof has been given of the existence of sylvatic plague by mass inoculations of fleas and lice obtained from the suspected rodents, ground squirrels of the species *Citellus townsendi*. *W. F. H.*

PUBLIC HEALTH REPORTS. 1937. Aug. 27. Vol. 52. No. 35. p. 1179.—**Fleas, Ticks, and Lice retain Plague Infection after 10 Months in Icebox.**

" Specimens of fleas, ticks and lice, taken from ground squirrels (*beechyi*) . . . and stored in the icebox . . . produced typical plague infection when inoculated into guineapigs " 10 months later.

W. F. H.

ADVIER (M.). Etude expérimentale du rôle de *Synosternus pallidus* dans la transmission de la peste. [**Rôle of** *Synosternus pallidus* **in the Transmission of Plague.**]—*Bull. Soc. Path. Exot.* 1937. Oct. 13. Vol. 30. No. 8. pp. 643–646.

Synosternus pallidus, a species of flea which has only recently been distinguished from *Xenopsylla cheopis*, is exceedingly common in Senegal. It lives and multiplies in the sandy soil of huts and no one can enter such a native dwelling without bringing away with him these insects on the legs. Investigation, and especially experimental investigation on animals, was called for on the capability of this species to act as a vector of plague. Some experiments have been carried out by the author. These experiments, coupled with prolonged investigation of epidemiological data, have led him to the conclusion that " *Synosternus pallidus* is not a regular parasite of the animals which form the principal reservoir of the plague virus. Consequently, the fleas of this species have little opportunity to ingest plague bacilli and, even if they do, they do not appear very capable of transmitting their infection. They do not, therefore, play any important rôle in the propagation of the disease." *W. F. H.*

De la Barrera (J. M.). La peste rural en la república Argentina. [**Rural Plague in the Argentine Republic.**]—*Bol. Sanitario.* Buenos Aires. 1937. June. Vol. 1. No. 6. pp. 452–487.

In this review the author gives all the facts and data available for a judgment on the epidemiology of plague in the Argentine, based mainly on his own experience in the territories* of the Pampas and Rio Negro. He has made several contributions on the subject already, as also have other authorities (see this *Bulletin*, 1935, Vol. 32, p. 447; 1936, Vol. 33, p. 362 and 1937, Vol. 34, pp. 409, 410). The questions discussed relate more to epizootics and enzootics than to epidemics, to sylvatic plague than urban plague, and to the species of rural rodent concerned than to the domestic rat. Two main types of rodent seem to be concerned in epizootics, those which are commonly designated "cuis" and the *Graomys griseoflavus*, a member of the family of *Cricetidae*. The name "cuis" includes the genera *Cavia*, *Galea* and *Microcavia*: the species of the genus *Cavia* are very similar in appearance to guineapigs. The rodent *Graomys griseoflavus* is arboreal in habit. In their habits these rodents are described as sylvatic or at most subdomestic, but not at all domestic, like the plague rat. "In no case" says the author, "have we seen or had it reported to us that the cuis penetrate into occupied human houses." These animals, moreover, are not used in the Pampas and Rio Negro either for their skin or their flesh. Fleas which are parasitic on the cuis are not of common kinds and little is known about them, although most of them have been named. The *Parapsyllus talis* seems to be the commonest species.

Plague appearances in the cadaver of the plague cuis were not quite the characteristic picture given by plague in the rat. In the male a testicular lesion of hypertrophy, congestion and haemorrhage was present with uncommon regularity. In the territory occupied by the cuis the domestic rat is not at all abundant; in fact rats are very scarce and none of the pestiferous fleas of the rat has ever been met with on the cuis. The arboreal rodent, *Graomys griseoflavus*, is a small animal. It is not very abundant in the south of the Pampas but has been extremely so in the north. A connexion appears to have been established between a small epidemic of human plague, which occurred in the department of Loventuel, and a severe epizootic in this rodent. At that time these animals were found not only in the hollows of trees but also, under stress of hunger, in human habitations.

It is scarcely possible to pronounce on the degree of danger to man from the field rodents of the Argentine, considering what are the habits of life of the natural animal reservoirs of plague, the sparseness of the population of the regions concerned, the absence of contact between man and the field rodent in habitations, and the absence of knowledge of the vector capacities of the ectoparasites of these rodents. It is probable that plague in these regions maintains itself in the intervals between epizootics in the same rodents of the field as are the known subjects of those epizootics. Prophylactically there seems to be little to recommend except that the peasant of the Pampas should be warned of the danger which he may run from those well-known rodents, especially in times when uncommon mortality is observed among them.

W. F. H.

* By a slip these territories were described in the previous summary (this *Bulletin*, 1937, Vol. 34, p. 409) as Brazilian.—W. F. H.

Fimayer (M.). Note sur un cas de peste bubonique apparu chez un contact de peste pulmonaire. [**Bubonic Plague from Contact with Pulmonary Plague.**]—*Bull. Soc. Path. Exot.* 1937. May 12. Vol. 30. No. 5. pp. 429–430.

A small epidemic of pulmonary plague had claimed nine victims. A tenth patient, in whom the disease also proved fatal, had no pulmonary symptoms, but had a submaxillary bubo. She must have contracted the disease from either her husband or daughter-in-law and the point of entrance of the infection is thought to have been either conjunctiva or upper air passages. *W. F. H.*

Meyer (K. F.), Connor (C. L.), Smyth (F. S.) & Eddie (B.). **Chronic Relapsing Latent Meningeal Plague.**—*Arch. Intern. Med.* 1937. June. Vol. 59. No. 6. pp. 967–980. With 3 figs. [25 refs.]

There were many points of interest characterizing this case of plague. It was sylvatic, a case of meningo-encephalitis and not simply meningism, and it was both chronic and relapsing.

The patient, 10 years old, was admitted to hospital after what had been a long and recurring illness and died 7 days later. He lived on a ranch, which is in the sylvatic plague area, and his illness began on June 19th with nausea, vomiting, high fever and delirium. Other symptoms were, mental confusion, diplopia and a right axillary bubo. Kernig's sign and stiffness of the neck were absent. These symptoms improved considerably, but on June 24th high fever set in, the axilla was brawny, tense and tender, and the cervical lymph nodes were enlarged. A report was received on 27th June that blood cultures had yielded a pure growth of *P. pestis*. Relief of symptoms was obtained when an abscess opened spontaneously. "Smears of this pus were nearly solid with *P. pestis*." The bubo healed and the enlarged nodes in the neck disappeared. Once again on July 16th the boy became acutely ill with stiff neck, Kernig sign and loss of consciousness and once more he improved markedly. Then for the last time he became acutely ill on October 8th and died on October 22nd.

At autopsy the cut surface of the spleen was diffluent. "Except for purulent bronchitis and early bronchopneumonia the only other pathological condition in addition to that in the spleen was in the brain," which was greatly swollen "due to internal hydrocephalus and ventriculitis with the exudate in the pia-arachnoid at the base." Microscopic, cultural and animal examinations confirmed the diagnosis of plague encephalitis and meningitis.

Most of the recorded cases of plague with cerebral symptoms show that true meningitis is rare and that when found it has been acute. It is also noteworthy that "meningitic involvement was most frequently recorded for patients who survived from the tenth to the twentieth day of the infection." It seems proven also from reports "that a patient not only in the acute but also in the chronic stage of plague, regardless of the severity of the infection, or an apparently healthy person who has been in contact with the infective agent, may be a carrier of virulent plague bacilli for a long time." The history of this patient "not only adds another interesting report to the ever increasing series of observations on latent plague, but forcibly indicates the progressively important need for studies of sylvatic plague and its relation to man. One cannot escape the impression that the recent cases of plague in the western states merely reflect the behaviour of an agent which causes mild infections with a tendency to latency." *W. F. H.*

Bezsonova (A.), Lenskaia (G.), Molodtzova (P.) & Mossolova (O.). Quelques cas de transmutation spontanée du *B. pestis* en *B. pseudotuberculosis rodentium* Pfeifferi. [**Instances of Spontaneous Transmutation of** *P. pestis* **into** *P. pseudotuberculosis rodentium.*]—*Bull. Office Internat. d'Hyg. Publique.* 1937. Oct. Vol. 29. No. 10. pp. 2106–2125. [35 refs.] [Summary appears also in *Bulletin of Hygiene.*]

The resemblance of *P. pestis* to *P. pseudotuberculosis rodentium* is very great and the differential diagnosis between them is both complicated and difficult, for the differential characters are chiefly quantitative. Biochemically *P. pseudotuberculosis rodentium* is a more active organism and behaves more like a saprophyte.

In the period 1929–1936 five strains of plague out of the 214 available have shown spontaneous transmutation. The resultant strains do not differ in any way from the strains already possessed of *P. pseudotuberculosis rodentium* but differ entirely from S and R variants of *P. pestis*. Once the transmutation of plague to pseudotuberculous character has taken place it appears stable; at least it has remained so for 1, 3, 5 and 7 years respectively. *W. F. H.*

Norman-Walker (J. N.). **Treatment of Plague Cases with Convalescent Human Serum.**—*Indian Med. Gaz.* 1937. Aug. Vol. 72. No. 8. pp. 469–473. With 3 charts.

Trials with various plague sera have been disappointing. In this communication an account is given of the use which has been made of the sera of human convalescents after the temperature has been normal for 10 to 15 days. Syphilis, tuberculosis and malaria have to be excluded. A dose of 20 cc. on three successive days was aimed at, but this amount of serum was not always available. These three doses were usually all that was required to bring the temperature down to normal. Forty-eight plague cases were treated with a case mortality of 16·7 per cent., while a series of 48 cases untreated gave a case mortality of 47·9 per cent. Arrangements are now being made to store convalescent serum for the treatment of the early cases appearing with the next epidemic. *W. F. H.*

Gilles (Eric C.). **Fumigation of Plague Suspect Imports in Colombo as a Means of controlling Plague in the Island.**—*Jl. Roy. San. Inst.* 1937. Aug. Vol. 58. No. 2. pp. 76–83. With 5 figs.

Practical demonstration has been given by the author of the effectiveness and economy of cyanide gas fumigation as an antiplague measure applicable to grain whether in bags or in mass, to granaries, and to the barges used for transport of the grain from the ship to the shore. It is rapid in operation and does not damage any particular type of article nor does it cause any deterioration in food value. It would be better to fumigate cargo on board ship, but this is not always possible, especially when the port of call is not a terminal one. In Colombo fumigation of loaded lighters was adopted for dealing with plague-suspect imports and special arrangements for mooring the grain barges near the warehouse front were made. Twenty-four lighters with 48,000 bags of grain could be treated daily.

The procedure was to load the cargo fully into the lighters round a central wooden peg, 3 inches square, which reached right down

to the bottom and was intended, when withdrawn, to permit insertion of the fumigation gas tube. Liquid hydrocyanic gas is the fumigant used, applied through an atomizing spray. Each "applicator" can be filled with sufficient liquid hydrocyanic acid to gas four lighters at a time and the time occupied in the process up to the pronouncement that the lighter is "free of gas" is about 4½ hours. The process, as is well known, has its danger and it must be supervised, but there is no doubt whatever about its convenience and effectiveness. "If reasonable care is exercised no fears of the dangerous properties of cyanide should be harboured while the uses to which it has been put in Colombo confirm that it adequately fulfills all expectations without any deleterious effects." *W. F. H.*

GILLES (Eric C.). **Hydrocyanic Acid Gas: its Practical Use as a Routine Fumigant in the Tropics.**—*Jl. Roy. San. Inst.* 1937. Aug. Vol. 58. No. 2. pp. 83–90. [Summary appears also in *Bulletin of Hygiene.*]

A full account is given here of the results of 2 years' experimental fumigation with hydrocyanic acid gas. During the past 3 years various substances have been tried out in Colombo, such as "Zyklon B, Celophite Units, Cyanogas A dust and Calcid," and the chief objection to liquid hydrocyanic acid seems to have been "that it would be dangerous to use in the tropics, as it is liable to undergo violent decomposition as a result of exothermic reactions associated with polymerisation in closed cylinders." This difficulty has been overcome and chemical means found of stabilizing liquid hydrocyanic acid for shipment to the tropics. The cylinders of liquid gas are, on arrival in Colombo, "placed upright in drums filled with water to one-half the height of the cylinder and stored in a cellar or cool room away from the direct rays of sunlight." The dosage of hydrocyanic acid for fumigation of ships is reckoned at 2 ounces per 1,000 c. ft. of space. As the actual cylinders could not be transported from shore it has been found convenient to have two sizes of portable containers, "applicators," with liquid capacities of 9 and 30 lb., for this purpose. "One applicator is used for each hold or other large compartment" and four to six applications are found to be adequate for the entire fumigation of an ordinary cargo vessel.

Gas masks are necessary for the fumigating staff. The medical officer in charge must make a final inspection of the vessel along with a ship's officer before fumigation is commenced and "*this inspection should under no circumstances be omitted.*" Particular note is made "that all doors are unlocked, lockers and drawers opened, alternate hatch covers removed, holds properly covered with tarpaulins, dunnage stacked and raised, ventilators closed, fires in galleys out, portholes closed with one lug only, pipe casings opened, steam shut down and, last but not least, that all the crew are off the ship with the exception of one officer, one engineer, two engine-room crew, and two deck hands." Fumigation usually continues for two hours after which comes the process of decyanization. The opening up of the ship is done in conjunction with the medical officer and the "time for clearance after fumigation has never exceeded six hours." A test paper is used, methyl orange or copper benzidene acetate, for the determination of freedom from poisonous gas. The crew come on board again and, under supervision, bring out pillows, blankets, mattresses, etc., for thorough airing in the sunlight.

It is interesting to note that the crew of a ship prefer cyanide to sulphur fumigation because it is so lethal to cockroaches and other vermin. Although owners and agents may prefer sulphur fumigation, because it does not necessitate making provision for the crew ashore, it seems probable that from the point of view of cost and time it may be superseded by hydrocyanic acid gas. *W. F. H.*

Reitano (U.). A propos de la valeur d'un vaccin pesteux vivant, dans les épreuves d'immunisation sur les animaux. (Note II.) [**Value of Living Plague Vaccine in Animals.**]—*Boll. Sezione Ital., Soc. Internaz. di. Microbiologia.* Milan. 1937. Mar. Vol. 9. No. 3. pp. 60–64.

It is evident from this study that every avirulent living strain of plague is not possessed of immunizing power. The avirulent strains which have so far been used in man for protective purposes are evidently of special character. In the experiments conducted by the author with his avirulent living strains doses up to 6 cc. of a bouillon culture and the whole surface growth of an agar culture were inoculated in guineapigs and in rats without producing any infection. Later tests with the strains available showed that they were very deficient in immunizing power. *W. F. H.*

Reitano (U.). Recherches sur la vitalité, sur la virulence et sur l'éventuel pouvoir immunisant du *B. pestis* desséché. (Note I.) [**Vitality, Virulence and Immunizing Power of Desiccated Plague.**]—*Boll. Sezione Ital., Soc. Internaz. di Microbiologia.* Milan. 1937. Mar. Vol. 9. No. 3. pp. 55–60.

Desiccation was effected in 24 hours at moderate temperature *in vacuo* and over phosphoric anhydride. Living cultures could be obtained from the dried bacilli up to 30 months after desiccation, but they were not infective to guineapigs even when mixed with other organisms. No immunizing power was manifested by the dried plague bacilli and therefore it is useless as a vaccine. *W. F. H.*

Public Health Reports. 1937. Oct. 29. Vol. 52. No. 44. p. 1535. —Vaccination against Bubonic Plague in Madagascar.

Sassuchin (D.) & Tichomirova (M.). De la conservation des *Pasteurella pestis* dans les larves et les nymphes des tiques *Dermacentor silvarum* Olen. [**Preservation of *Pasteurella pestis* in the Larvae and Nymphs of the Tick.**]—*Rev. Microbiol., Epidémiol. et Parasit.* 1936. Vol. 15. No. 3–4. [In Russian pp. 357–361. French summary p. 362.]

The larvae and nymphs of the tick *Dermacentor silvarum* infest rodents such as spermophils, gerbils, *Arvicola* and others. Epizootics of plague have also affected these same rodents and as the tick in its adult stage can parasitize large animals such as the camel, horse and man, it was worth while investigating the possibility of transmission of plague from larva or nymph to adult tick and thence to man. Larvae and nymphs were fed on plague infected guineapigs and it has been possible to isolate plague bacilli from larvae after 2, 4, 6 and 10 days and from nymphs after 2 to 6 days. No success was registered, however, in transmission of plague virus from the larval stage to the nymph stage. *W. F. H.*

HELMINTHIASIS.

LINS (Abdon Eloy Estellita). Ovohelmintoscopias. [**Search for Worm Ova in Faeces.**]—*Boletim da Secretaria Geral de Saude e Assistencia.* Rio de Janeiro. 1936. Dec. 31. Vol. 2. No. 5. pp. 83–93. With 8 figs. on 5 plates. English summary (10 lines).

The author employing the technique described below states that he obtained much better results from direct examination than by ordinary methods [he does not compare his with the more highly concentrating methods of Clayton LANE, and others].

He employs an "enrichment fluid" composed of acetic acid 5 cc., formol 10 cc., hydrochloric acid 75 cc. and distilled water 110 cc. and the steps of the procedure are as follows :

One cc. of the enrichment fluid is placed in a conical glass with an equal amount of faeces and the two mixed with a glass rod to a uniform suspension, after which the reagent is added slowly to 20 cc. and after rapid stirring with a glass rod is transferred to a centrifuge tube and spun for two minutes ; the supernatant fluid is decanted and the deposit spread with a pipette on a slide and examined.

Among the advantages claimed for this method are that the morphology of eggs and larvae is not altered, that the specimen keeps well for demonstration purposes, and gives a higher percentage of positive findings, 40 per cent., as compared with an average of 12 per cent. *H. H. S.*

ARTIGAS (P. de Toledo). **Mounting of Helminths and Small Arthropods. A New, Simple and Efficient Method.**—*Mem. Inst. Butantan.* 1935–1936. Vol. 10. pp. 71–75. With 10 figs. on 4 plates. [Portuguese version pp. 65–70.]

" In this paper a new method is described for toto-mounting nematodes. This new method can also be used with plathelminths and small arthropods.

" The mounting medium is obtained by dissolving mastic resin (from *Pistacia lenticus*) in creosote [beechwood creosote].

" This mastic-creosote fluid is prepared as follows :

" 30 cc. of 95 per cent. alcohol are added to 10 gm. of pulverized mastic. The mixture is left in an incubator at 55°C., for 24 hours. Then, the alcoholic mastic is taken off and, after cooling, centrifuged. The sediment is then poured off by decantation and, if necessary, the fluid is centrifuged once more.

" 30 cc. of pure creosote are added to the alcoholic mastic and the whole mixture is placed in the incubator at 55° until complete evaporation of the alcohol. The resulting fluid, which is clear and sirupy, after solidification takes a yellowish coloration.

" A very simple mounting technic has thus been adopted :

" 1. Treatment with acetic acid. The length of time required varies according to the thickness and size of the nematode and is completed with its clearing.

" 2. Treatment with creosote. In this substance remains the nematode until fully impregnated. There is no harm to the specimen in prolonging this step for some hours.

" 3. Mounting between slide and cover-slip in mastic-creosote fluid.

" 4. Hardening of the mounting medium in the incubator at 50°C.–55°C.

" In order to obtain coloured preparations, the material must be treated with hydrochloric carmine or Semichon's acetic carmine (prepared according to Langeron's indications). The staining precedes the other steps

of the mounting technic. Overstaining differentiation is done by means of hydrochloric water or hydrochloric alcohol."

[Presumably glacial acetic acid is intended.] *Clayton Lane.*

WEBB (J. Lewis). **The Helminths of the Intestinal Canal of Man in Mauritius; and a First Record of** *Trichostrongylus axei* **Locally.**—*Parasitology.* 1937. Oct. Vol. 29. No. 4. pp. 469–476. With 11 figs. [13 refs.]

"Systematic measurements of all hookworm-like eggs from the faeces of 336 patients in Mauritius led to the finding of 8 per cent. Trichostrongyle, 0·9 per cent. *Ternidens deminutus*, and 0·9 per cent. *Ancylostoma braziliense*-like eggs. This percentage of Trichostrongyle eggs includes one case from an inhabitant of the French colony, Réunion.

"Hookworm eggs of a very small size, possibly *Ancylostoma braziliense* were found unassociated with the typical *Necator americanus* eggs, in the faeces of an inhabitant of Rodriguez; the adult worms appeared drug-resistant. A partial eradication of the Trichostrongyles was obtained in one case, and an apparently complete eradication in another, of 6 patients treated with carbon tetrachloride. The Trichostrongyles expelled by one of the patients were identified as *Trichostrongylus axei* (Cobbold, 1879) Railliet & Henry (1909). No particular symptoms which could be ascribed to the action of the Trichostrongyles were observed in any of the affected patients. Drugs administered orally to a patient passing *Ternidens deminutus*-like eggs failed to dislodge any of his worms."

C. L.

NEUJEAN (G.). Le parasitisme intestinal chez les indigènes des hauts plateaux (environs de Kitega). [**Intestinal Parasitism in the Inhabitants of the Kitega District.**]—*Ann. Soc. Belge de Méd. Trop.* 1937. Sept. 30. Vol. 17. No. 3. pp. 343–349.

The author has examined the records of patients admitted to hospital during the period 1929 to the end of October 1936, to find out the number with parasitic infections, and the relative frequency of occurrence of these parasites. Those who have been admitted more than once are counted as fresh patients. The examination of the stools was made by direct smear and the results are, consequently, an understatement. Altogether 13,460 were examined; all the findings are given as percentages. An average of 64 per cent. were infected, the limits in any one year being 59 and 67, so that the infestation rate is fairly constant. Of helminthic parasites Ascaris was the commonest, 35 per cent., Trichuris next 25, and Ankylostome 11·9, *Taenia saginata* 9·3. These are the averages over the whole period. Sixty-two per cent. harboured one parasite only, 29 had two, 7 had three, and one per cent. had four, rarely as many as seven were found. Actual figures and percentages are given in tables. *H. H. S.*

LEGENDRE (F.). Le parasitisme intestinal au Cambodge. [**Intestinal Parasitism in Cambodia.**]—*Bull. Soc. Path. Exot.* 1937. July 7. Vol. 30. No. 7. pp. 570–572.

A report on 361 stools examined in Cambodia by simple smear and if negative by the Willis technique.

The percentages of infection so revealed were, hookworms 54, ascaris 30, trichuris 9, strongyloides 9, dysenteric amoeba 14 and trichomonas 9. There were also detected infections with *Clonorchis*

sinensis, *Taenia saginata*, *Hymenolepis nana*, Lamblia and Balantidium. As to multiple infections there were five once, four 5 times, three 28 times, two 97 times, and simple infections with hookworms numbered 87, ascaris 37, dysenteric amoebae 24, strongyloides 7.

C. L.

HUKUDA (Saburo) & AKI (Kenji). Ueber die Darm-Parasiteneier, die an " Tukemono " haften. [**On the Eggs of Intestinal Parasites which adhere to " Tukemono."**]—*Jl. Oriental Med.* 1937. Aug. Vol. 27. No. 2. [In Japanese pp. 89–94. German summary p. 9.]

In the State of Darien some 35 per cent. of " Tukemono " in markets have adherent to them eggs of ascaris, ankylostomes, trichuris, metagonimus, or taenia ; ordinary rinsing does not clean " Tukemono," which is, accordingly, a large factor in the spread of worm infections.

C. L.

BRUG (S. L.) & TESCH (J. W.). Parasitaire wormen aan het Lindoe Meer (Oa. Paloe, Celebes). [**Parasitic Helminthic Infestations in Inhabitants by the Lindoe Lake, Celebes.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1937. Sept. 7. Vol. 77. No. 36. pp. 2151–2158. With 2 figs. (1 on a plate). English summary.

Lindoe Lake is a secluded part, 1,000 metres above sea-level, in the Paloe District. The authors examined, by direct smear apparently, 98 samples of faeces and found a very unusual distribution of helminthic ova. Trichuris was not seen in any, Ascaris in 3 per cent. only and most of these were unfertilized. Ankylostome ova were found in 35 per cent. but in many cases the infestation was very mild, perhaps only one egg in a slide. Ova of *Sch. japonicum* were seen in 8 per cent. and the infection-index was probably much higher.

Eggs were seen in a large proportion of those examined which were indistinguishable from those of *Echinostoma ilocanum*, a diagnosis checked by Dr. TUBANGUI of Manila, who, however, stated that no adult flukes being submitted to him he could not be quite certain. They were found in 47 per cent. of the total and in one village in 21 out of 25 specimens.

H. H. S.

MÜLLER (H.) & TESCH (J. W.). Autochthone infectie met *Schistosoma japonicum* op Celebes. [**Indigenous Case of Infestation by *Sch. japonicum* in the Celebes.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1937. Sept. 7. Vol. 77. No. 36. pp. 2143–2150. With 5 figs. on 1 plate. English summary (7 lines). [16 refs.]

" Description of a case of an autochthonous infection with trematode eggs in a native from the environments of Lake Lindoe (Central Celebes) discovered during the histological examination of the inner organs and first thought to be paragonimiasis. BRUG showed by isolation of the eggs that it was schistosomiasis japonica. This is the first autochthonous case known from the Netherland Indian Archipelago."

VAN DEN BERGHE (Louis). Quelques faits nouveaux concernant la migration et la ponte des schistosomes. [**New Facts on the Migration and Oviposition of the Schistosomes.**]—*Ann. Parasit. Humaine et Comparée.* 1937. July 1. Vol. 15. No. 4. pp. 354–362. With 2 figs. on 1 plate.

The paper brings out three new facts regarding the migration and oviposition of schistosomes, and confirms three others contested by some writers and ignored by others.

As to the first it is recorded and confirmed by micro-photographs that in the uterus of *S. bovis mattheei* the egg may lie with its spined end pointing to the head or to the tail of the mother worm; the females of *S. margrebowigi* of the antelope *Onotragus* (*Cobus*) *lechwe* of Lake Kisale in the Belgian Congo may lie outside blood vessels and probably in lymphatic vessels; *S. mansoni* may not be limited to network of the inferior mesenteric vein. As to the second, in all these species female worms may be found alone in the veins near the bowel, whole solitary males are far rarer there, though in the liver they are four times as common as solitary females; paired worms are present not only in the vessels near the submucosa but also in the large mesenteric arches; eggs in the liver may have been carried there by the blood current or may have been posited there, for apart from *S. japonicum* the worms may inhabit any part, intestinal or visceral, of the portal system. *C. L.*

SCADUTO (Pasquale). Considerazioni su alcuni casi di bilharziosi vescicale. [**Some Cases of Vesical Bilharziasis.**]—*Arch. Ital. Sci. Med. Colon. e Parassit.* 1937. Apr. Vol. 18. No. 4. pp. 235–243.

Eight cases are described from Tripoli with eggs of *Schistosoma haematobium* in the urine and in two of them in the faeces also.

C. L.

KRÖBER (F.) Ein Fall von doppelseitiger Hodentuberkulose, die mit Bilharzia vergesellschaftet war.—*Arch. f. Schiffs- u. Trop.-Hyg.* 1937. Oct. Vol. 41. No. 10. pp. 644–647. With 1 fig.

EERKENS (J. W.) & VAN DER HORST (G. A.). Een geval van Schistosomiasis Japonica te Semarang.—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1937. Sept. 21. Vol. 77. No. 38. pp. 2305–2310. With 2 figs. on 1 plate. English summary (4 lines).

SERRA (Giovanni). Il rame, quale nuovo rimedio nelle bilharziosi intestinale e vescicale. [**Copper in the Treatment of Intestinal and Vesical Bilharziasis.**]—*Arch. Ital. Sci. Med. Colon. e Parassit.* 1937. Apr. Vol. 18. No. 4. pp. 244–253.

The remedies used in these 15 cases, treated at Jadotville in the Belgian Congo, were dicuprene intravenously in 4, paludex by mouth in 8, and both drugs by the routes indicated in 3. The drugs were given daily without ill effects in any case and the reports of efficiency are good.

The daily dose of dicuprene lay between 5 and 10 cc. All 4 persons had an intestinal infection with *S. mansoni*. Eggs disappeared on

days 6, 5, 11 and 10. The daily dose of paludex was sometimes 0·5 gram, sometimes 1·5 gram and sometimes progressively increasing from 1·2 or 1·25 to 2 grams, and eggs disappeared on days 7, 8, 8, 8, 10, 11, 8 and in the remaining case were disintegrated at the last report. It is concluded that oral administration is more effective, quick, and constant and needs no special apparatus. *C. L.*

GMINDER (Ernst). Bilharziose und Operation. [**Bilharziasis and Operation.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1937. Oct. Vol. 41. No. 10. pp. 647–650.

Some operations, which have in common the fact that they have been undertaken for non-bilharzial conditions in persons who had this infection and who had recently been treated with fouadin, have been followed by bleeding. It is suspected that this may be due to a lessening of clotting power, the result of the drug. It is accordingly suggested that there should be an interval of at least 4 weeks between the end of such a course of treatment and any operation. *C. L.*

LA RUE (George R.) & AMEEL (Donald J.). **The Distribution of *Paragonimus*.**—*Jl. Parasitology.* 1937. Aug. Vol. 23. No. 4. pp. 382–388. [37 refs.]

There is considered the distribution of Paragonimus in general and in North America in particular.

As to North America :

"The snail is evidently the most important factor in limiting the distribution of *Paragonimus*. The mink, unquestionably the normal definitive host in North America, is an inhabitant of all the wooded habitats on the continent where there is permanent fresh water. It is absent only in northern Labrador, in Newfoundland and in Greenland. However, intensive trapping for its valuable pelt has so reduced the numbers of the mink that probably it has disappeared from many portions of its former range, with a resultant diminution of the range of *Paragonimus*. Furthermore, *Paragonimus* through the great reduction in numbers of its definitive host may be so rare in many localities as to escape detection. The crayfish, while far more limited in distribution than the mink, is present in a large part of the same range wherever compatible conditions exist. As will be noted from the list of locality records given below, the snail, *Pomatiopsis lapidaria*, is still unknown from a large part of the region occupied by the mink and the crayfish. Apparently it is uncommon in many parts of its range, though it may be abundant in restricted areas."

C. L.

MORI (Junzo). Beiträge zur Kenntnis der Entwicklungsgeschichte, speziell der biologischen Eigenschaften des *Paragonimus westermanii*. [**The Development of *P. westermanii* with Special Reference to Biological Peculiarities.**]—*Sei-I-Kai Med. Jl.* 1937. Apr. Vol. 56. No. 4. [In Japanese pp. 585–618. With 10 figs. (6 coloured) on 2 plates. [42 refs.] German summary pp. 5–7.]

The travels of *P. westermanii* from the freeing of the cysts in the small intestine to their adult condition in the lungs.

The experimental animals were 21 kittens, 4 pups and one white rat. The belief is that the larvae pierce the small intestine and make for

the pleura, through the liver if it lies in their way and in any case through the diaphragm, bore into the lungs and so into pulmonary vessels or bronchi, though some may get into the lungs by the blood vessels. It is not stated whether in all three species of experimental animals used the conditions found were the same. The beautiful figures lose much of their worth for non-Japanese readers owing to the failure to translate their legends into the European language chosen for summary, an omission which is not always found in the journal. *C. L.*

Meira (João Alves) & Hosoe (Ignacio Shizuo). Sobre um caso de distomatose pulmonar (Paragonimiase). [**A Case of Paragonimiasis.**]—*Hospital.* Rio de Janeiro. 1937. Sept. Vol. 12. No. 3. pp. 385–399. With 6 figs. [14 refs.] English summary.

A Japanese, who had been only about a year in Rio de Janeiro, had this infection. His illness had a long history. *C. L.*

Kuang Wu. Deux nouvelles plantes pouvant transmettre le *Fasciolopsis buski*. Revue générale. [**Two New Plants on which Infection with** *F. buskii* **may be transmitted.**]—*Ann. Parasit. Humaine et Comparée.* 1937. Sept. 1. Vol. 15. No. 5. pp. 458–464. With 1 text fig. & 7 plates. [12 refs.]

The two new plants on which metacercariae of *Fasciolopsis buskii* have been found are *Salvinia natans* and *Spirodela* (*Lemna*) *polyrhiza*. After a short note on the life history of this fluke and on the different plants used by the cercaria for encystment, it is felt that this is not a fastidious creature, but can live on almost any kind of water plant which grows in stagnant water near infected snails. The newly implicated plants float on the surface of water collections in which are cultivated two other of these vegetable hosts, the water chestnut and the water bamboo. About 20 cysts have been found on the under surface of a single leaf of each of these plants which put down long roots very rich in cellular tissue. They are common in the endemic area about Chekiang, except in winter. *C. L.*

McCoy (Oliver R.) & Chu (T. C.). *Fasciolopsis buski* **Infection among School Children in Shaohsing and Treatment with Hexylresorcinol.** —*Chinese Med. Jl.* 1937. June. Vol. 51. No. 6. pp. 937–944.

Of 349 children, from whom 0·005 gram of faeces was examined in decinormal caustic soda solution, 65 per cent. showed eggs of *F. buskii*. Of the positives, 129 were treated with hexylresorcinol and the results are given.

The positive percentages at different ages varied between 60 and 74, while for males they were (by coincidence) 60 and for females 74 taking all ages together. The percentage of the positive cases which showed up to 5,000 eggs per gram of faeces was 54, between that and 20,000 was 38 and above that number 8. In addition only 11 per cent. of those examined were free from intestinal helminths, 48 per cent. harboured ascaris, 19 per cent. trichuris and only 2 persons (0·6 per cent.) hookworms to this method of faecal examination.

"According to Stoll and Kwei (1932) [Stoll, Cort & Kwei, this *Bulletin*, 1927, Vol. 24, p. 981] the egg production of a single worm averages 250 eggs per cc. of formed stool. Hence, the majority of children harbored

comparatively light infections of 20 worms or less. Only 17 students (5 per cent. of the total number examined) had egg counts of more than 20,000 eggs per cc., equivalent to infections with 80 worms or more. The highest egg count in the series, 158,000 eggs per cc. (= approximately 640 worms) was found in a nine year old girl. This girl was the only child in the entire group who showed the classical symptoms of fasciolopsiasis, namely diarrhea, distended abdomen, edema of the face and stunted development. Incidentally, the parents of this girl refused to allow treatment. According to Barlow (1925) the presence of only a few worms is sufficient to cause symptoms. If a careful physical examination had been made of these children, undoubtedly many more would have been found to be suffering from the effects of the parasite."

Dosage of hexylresorcinol was from 0·4 gm. for a child under 7 to 1 gm. from 13 years onwards. On re-examination 2 to 3 weeks after treatment egg numbers were as follows. No reduction to 50 per cent. reduction, 5 per cent. ; 60 to 80 per cent. reduction, 6 per cent. ; 80 to 90 per cent. reduction, 11 per cent. ; "90 to 100 per cent." reduction, 23 per cent. ; no eggs, 54 per cent.

"The majority of children treated experienced no ill effects from the drug aside from slight gastric discomfort for about two hours after taking the drug. In about 10 per cent. of cases, however, nausea and abdominal cramps were quite severe and the patients experienced a definite chill. A purge of magnesium sulphate was given to these children (about 2 hours after the drug) and after an hour or two of rest, the symptoms subsided. Four children vomited, but the pills had already dissolved and could not be recognized in the vomitus. Re-examination later showed that the treatment of these cases had been successful.

"In three children who experienced severe intestinal cramps and chills, a diffuse urticaria appeared which persisted for several hours."

"Six of the 7 hospital patients were re-examined after one week. Their total egg count had been reduced 96 per cent. and an estimated number of 380 worms removed. Less than half of this number were recovered within 24 hours after treatment. The remainder must either have been passed on succeeding days or have disintegrated within the body. This observation emphasizes the well-known fact that the effectiveness of treatment with hexylresorcinol should not be judged solely by the number of worms passed immediately following treatment."

[The worm-egg ratios of STOLL, CORT and KWEI were based on counts made on six cases, in which the eggs counted per fluke recovered varied between 14,623 with exactly 300 flukes recovered and 48,125 with 32 flukes. Variations of 3½ times in such a small series are surely a poor basis for confident general conclusions. Further, the earlier writers wrote "The worm counts for *Fasciolopsis buski* are relatively simple with such large parasites, and undoubtedly are more accurate generally speaking than for hookworms," and they collected all worms passed for three days. The use of these six cases as a basis for general worm egg ratios must further lose value in proportion as dead worms are digested as they slowly pass down the bowel.] *C. L.*

OTTO (Johann Heinrich F.). Ueber den chinesischen Leberegel *Opisthorchis sinensis*. Zur Entstehung, Erkennung und Behandlung der durch ihn bedingten Krankheit. [**The Mode of Infection, Diagnosis and Treatment of** *Clonorchis sinensis*.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1937. July & Aug. Vol. 41. Nos. 7 & 8. pp. 481–505 ; 552–565. [8 pages of refs.]

A very wide survey of present knowledge on these different aspects of this infection. *C. L.*

KELLER. Note sur une nouvelle méthode de traitement de la sparganose oculaire. [**A New Treatment of Ocular Sparganum Infection.**] —*Bull. Soc. Méd.-Chirurg. Indochine.* 1937. May. Vol. 15. No. 5. pp. 524–536.

The Director of the Ophthalmological Institute of Hanoi details 12 cases in which ocular sparganum infection has been treated with novarsenobenzol with results hitherto unequalled.

Keller has treated over 60 cases of this infection. At first an enthusiastic advocate of surgery, he has come to regard this as not merely useless but dangerous, for the ophthalmia does not disappear with operation, may indeed be increased, with corneal ulceration, panophthalmitis and the necessity to remove the globe, in order to get rid of all the parasites. The frog poultice which gives the infection may be applied over the eye after simple opening of its abdomen, after evisceration, or it may consist of sliced frog muscle. Apparently there is a thermotaxis and the invasion by the parasite gives rise to itching, smarting or burning, with immediate oedema and the rapid onset of inflammation. Local injections proved unsatisfactory (though cure may be spontaneous), and the closure of the lids by tarsorrhaphy was of some advantage in the last resort. Then intravenous injections of novarsenobenzol were tried, tarsorrhaphy being also undertaken to preserve the cornea till the worms had been killed. The dose of the drug is 30 cgm. for adults and 7 to 15 for children according to age, two to six doses having been given at intervals of 4 or 5 days. The parasites, as a rule, were adsorbed, rarely they were discharged on to dressings, relief beginning with the first dose. *C. L.*

YMAZ APPHATIE (I. Lucio). Purificación de la toxina y anatoxina hidática. [**Purification of Hydatid Toxin and Anatoxin.**]—*Prensa Méd. Argentina.* 1937. Sept. 8. Vol. 24. No. 36. pp. 1731–1733.

When hydatid fluid is treated with trichloracetic acid albumen is precipitated; this is separated quickly and redissolved in alkali. The acid precipitates, at *p*H 4 or lower, the toxalbumins and anatoxin, which are separated by centrifuging, redissolved in solutions of carbonate and phosphate of sodium and made up to the original volume by normal saline.

The author's technique for separating the hydatid toxalbumin is as follows :—

To the transparent hydatid fluid, *p*H 6·7, are added 4 drops of normal solution of trichloracetic acid for each cc. of fluid, the *p*H reduced to about 3, the product being then shaken and put aside for 10 minutes when a fine turbidity forms which is thrown down by centrifuging. The precipitate is dissolved in 0·9 per cent. NaCl with addition of 4 drops of normal Na_2CO_3 and the *p*H becomes 6·5. The amount of saline employed is one-fifth of the hydatid fluid, so that the albumen is in a five-fold concentration.

For separation of the anatoxin :—

To 10 cc. of the anatoxin of *p*H 6·3 are added 10 drops of normal trichloracetic acid; the mixture shaken and in 10 minutes a suspension forms which is thrown down by centrifuge, redissolved in 0·9 per cent. NaCl (one-fifth of the original volume) and one drop of normal Na_2CO_3; the product is purified and five-fold concentrated anatoxin with *p*H 6·6.

The supernatant fluid after centrifuging off the precipitate formed with the trichloracetic acid is neutralized with normal Na_2CO_3, 2 drops

for each cc, and the resulting fluid, of *p*H 6·4, contains the saccharide fraction of the liquid.

The albuminoid fraction gives more intense intradermal reactions than does the pure hydatid fluid ; the saccharide fraction also more than the pure fluid but less than the albuminoid fraction, in fact intermediate. Similarly the albuminoid fraction has a much higher specific antigenic potency than the saccharide fraction. *H. H. S.*

Penfold (W. J.), Penfold (H. Boyd) & Phillips (Mary). **The Criteria of Life and Viability of Mature** *Taenia saginata* **Ova.**—*Med. Jl. Australia.* 1937. July 3. 24th Year. Vol. 2. No. 1. pp. 1–5.

The attempt was made to discover whether there was any method of determining viability of onchospheres apart from infecting experiments, and, this failing, these were used to test the effects of other conditions on their length of life.

The writers, after long continued observations, have never been able to satisfy themselves that there were flame cells in onchospheres, nor did absence of movement in the onchospheres themselves signify death, seeing that batches of motionless eggs were able to infect. Of onchospheres kept in normal saline at 2°C. to 5°C. for 13½ weeks some were, but after 14½ weeks none was, viable ; while if kept in this solution for 9 weeks and then exposed on pastures for 8 weeks in mild weather conditions, some were still viable. Again those kept on dry pastures for 14½ weeks might be viable, while of onchospheres kept dry for two days under laboratory conditions some were viable. [Air convection is then at least a possibility.] If, however, dried in normal saline, that is with a salt solution becoming steadily stronger, none was alive after one day. Probably eggs do not survive on pastures in Victoria for many months. *C. L.*

Maplestone (P. A.) & Bhaduri (N. V.). *Taenia solium* **and** *Cysticercus cellulosae* **in India.**—*Indian Jl. Med. Res.* 1937. July. Vol. 25. No. 1. pp. 155–161. [26 refs.]

"This brief survey of the puzzles in the epidemiology of *T. solium* and cysticercosis in India suggests two possibilities ; one that there are factors in the transmission of these infections with which we are at present not acquainted, and that the accepted life-history of this worm is subject to certain modifications depending on local conditions, and the other is that our records are at present altogether misleading. Whichever of these be accepted it is clear that there is a great deal to be known about the epidemiology of this parasite in India before the disease can be adequately controlled."

This survey of the literature, while not claiming completeness, has been thorough. For the 59 years up to 1925 only 10 cases of cysticercosis were reported in Indians. In the last 23 years 82 cases have been reported from British soldiers who were serving or had served in India, and of them 22 harboured tapeworms. As to pig infection, Duncan Stewart in 1844 commented on how often pork had to be thrown away in Calcutta on account of its measly state, while the writers believe that the same holds good to-day. With this frequent pig infection there must be either some definitive host other than man, an unlikely thing, or infection with the strobile must be far commoner in Indians than present knowledge shows ; while as to the cysticercus

in them, it is held that its effects in causing fits and mental derangement would have led to its being brought to the wide notice of medical men. Accordingly it is suggested that there may have been developed in Indians an enhanced resistance to infection by the onchosphere; while as to the absence of report of strobiles in so many European soldiers infected with cysticerci, it is suggested that on occasion these may be digested, so freeing the eggs, as LEIPER has shown to be the case for *D. latum* [this *Bulletin*, 1937, Vol. 34, p. 399]. [The work of PENFOLD, PENFOLD & PHILLIPS (above) suggests the likelihood that air convection is one of the missing factors.] *C. L.*

RAO (M. Sambasiva). **Cysticercosis as a Possible Cause of Epilepsy in an Indian.**—*Lancet.* 1937. Sept. 18. p. 689.

A Hindu coolie, aged 28, was admitted to the Perampur, Madras, Hospital having started jerking movements of the left forearm 3 days earlier. There was no aura before the attacks and no unconsciousness. A nodule in the right deltoid, which he claimed to have cherished for 20 years, proved on excision to be a typical cysticercus, the scolex having 4 suckers and a double row of hooks. It was uncalcified and X-rays showed no shadows in the brain. He used to eat pork but, he said, had never had a tapeworm. *C. L.*

SUNKES (E. J.) & SELLERS (T. F.). **Tapeworm Infestations in the Southern United States.**—*Amer. Jl. Public Health.* 1937. Sept. Vol. 27. No. 9. pp. 893–898. [13 refs.]

A survey of literature and of answers to questionaries received from 11 of 13 State Board of Health Laboratories to whom they were addressed.

"Nine hundred twenty-seven thousand six hundred twenty-five fecal examinations in 13 southern states from 1931–1935 inclusive, show 8,085 positive tapeworm findings of all types, a mean incidence of 0·87 per cent. Of the 7,249 positive findings which could be classified, 98·6 per cent. were the dwarf tapeworm (*H. nana*), an average incidence of 1·1 per cent. Only 100 other types of tapeworms [? tapeworms of other types] were found in this survey, of which 58 were beef tapeworm (*T. saginata*); 32 rat tapeworm (*H. diminuta*); 8 pork tapeworm (*T. solium*) and 1 each fish tapeworm (*D. latum*) and dog tapeworm (*D. caninum*).

"Histories are given of cases of human infestation with the fish tapeworm, the rat tapeworm and the dog tapeworm.

"Data regarding the prevalence of human infestations with tapeworm are incomplete due to the failure of a number of state board of health laboratories to classify their findings."

C. L.

CASTELLANI (Aldo). **Luetic Pseudo-Cysticercosis.**—*Jl. Trop. Med. & Hyg.* 1937. Oct. 1. Vol. 40. No. 19. p. 232. [Summary appears also in *Bulletin of Hygiene.*]

The condition described is characterized by the presence of small nodules, the size of rice-grains, seeming to lie free in the subcutaneous tissue or in the muscle fascia of legs and arms. They are hard or slightly elastic, little if at all tender, not itching and not accompanied by eosinophilia. The author refers to three such cases coming under his observation, two of which had been diagnosed as cysticercosis and

the third as cysticercosis or trichiniasis. The Wassermann reaction was strongly positive (4 plus), though none gave a history of syphilis. The nodules were found to consist of fibrous tissue and showed no signs of any helminthic infestation. Antisyphilitic treatment was followed by rapid recovery; in the one case detailed, a man of 24 years, these nodules were numerous, but disappeared within three weeks when he was given neoarsphenamine and bismuth injections.

H. H. S.

Corrigendum.

A comment appeared in a summary of Dr. Denis Plum's paper "Observations on Ankylostomiasis and Anaemia in Kenya" published in this *Bulletin*, 1936, Vol. 33, No. 2, p. 115, to the effect that the reviewer was "unable to bring himself to believe that the dosage used for carbon tetrachloride was really 40 cc. in most cases and for ascaridole up to 40 cc." Dr. Plum writes that, as printed in his paper, the dosage for carbon tetrachloride was in minims not cc., and the dosage in cc. referred not to ascaridole but to the Bayer preparation known as "Ascaridol" of which the adult dose is 30–40 cc. Enquiry of Messrs. Bayer Products Limited confirms the fact that they make a preparation under the name of Ascaridol "Bayer" solution which contains 2·5 cc. of the active principle of oil of chenopodium to 100 cc. ol ricini, so that each 1 cc. of the solution corresponds to 1 drop of ol. chenopodii. Their use of the name Ascaridol "Bayer" for a preparation that is not undiluted ascaridole has thus caused confusion, and we apologise to Dr. Plum for the comment which appeared on his paper.

Ed.

MEDICAL AND SANITARY REPORTS.

THE STATE OF NORTH BORNEO (1936).

The State of North Borneo, occupies with adjacent islands, the Northern portion of the Island of Borneo. It lies about 1,000 miles N.W.N. from Singapore and approximately 1,200 miles S. of Hong Kong, has a total area of about 31,000 square miles, and a coast line of some 900 miles. The territory is under the jurisdiction of the British North Borneo (Chartered) Company, the appointment of the Governor is subject to the approval of the Secretary of State. Headquarters of administration are at Sandakan on the East Coast.

Introductory Note.—At the request of the authorities of the State of North Borneo, and for the first time in the history of these *Tropical Diseases Bulletin Supplements*, we are privileged to include a summary of the Annual Report of the Medical Department of the State for the year 1936. On this occasion, by reference to earlier reports and other official sources, a somewhat more extensive summary than usual has been prepared in the hope that the reader be provided with a reasonably complete picture of the scope, activities, and responsibilities of the Medical Department concerned. Where comments upon special features characterizing conditions of health, etc., in North Borneo, obtained by references made to the contents of earlier Reports are deemed necessary in the course of the present Summary, such observations will appear in parentheses.

Vital Statistics.—The estimated population at the end of the year under review is returned as 290,256; the method applied for the calculation of annual estimates is that involving addition of the excess of births over deaths and immigration over emigration, to the estimate obtained in the preceding year. [As regards the reliability of these annual estimates, earlier reports refer to the importance, for the purpose of intercensal estimates, of having correct and complete enumerations of the people at regular intervals, complete and accurate registration of births and deaths, and correct immigration and emigration records. The degree of completeness achieved by vital registration in North Borneo is commented upon below. The *Census* of 1931, said to be "as complete as can be expected in the present state of the country's development" enumerated a total of 270,223 persons, distributed as to 205,218 natives of Borneo, 47,779 Chinese, the remaining 17,000 odd comprising Europeans, Eurasians, Malays, etc. The tribal classification of natives of Borneo reads *Dusuns* 117,482, *Muruts* 24,444, *Bajans* 34,099, *Bruneis* 21,112, and *Sulus* 8,081. Classification of the population by race or tribal group is not given in the Annual Report under review.]

Registered births numbered 8,184 and *deaths* 6,282, the resulting birth and death rates being 28·2 and 21·6 respectively. *Infant deaths* numbered 1,431, giving an infant mortality rate of 176·5 per 1,000 live births. [Of the total births 8,106 were live births] Births and deaths are classified by race and sex for each District, and deaths in 8 age-groups for each District. Of vital registration in general the Report observes "Registration of births and deaths is compulsory throughout the whole territory; at the same time these statistics should be accepted with reserve. Owing to the fact that a large part of the population of the Interior and West Coast lives in remote villages, the registration of births and deaths is necessarily incomplete." [In this connexion it may be pointed out that in 1935, 3,000 births were

registered relating to children whose births had actually occurred *before* that year. These were discovered when children entering school were required to produce certificates.]

The average *labour force employed on Estates*, Logging Camps, etc., was 9,135. Health conditions throughout the year are reported to have been good; 126 deaths were recorded. Estate labourers admitted to Hospital for *malaria* numbered 1,734, with 31 deaths, for *beriberi* 161 cases with 5 deaths, *pneumonia* 120 cases with 32 deaths, and *dysentery* 102 cases and 5 deaths. The mass treatment of labourers for *ankylostomiasis* was continued and 4,172 labourers treated.

Maternity and Child Welfare Work.—In the Report under review little information is available, but it is clear that such work is actively implemented from the references to the weekly clinics held at numerous centres, records of spleen rates for infants and children contributed by Medical Officers, etc. As regards midwives the *Midwives Ordinance* of 1931 prescribed regulations and syllabuses for examinations and for the supervision of midwives.

In 1935 a scheme for the training of young women as midwives for work in native villages was approved and two Chinese were selected to commence the course of training. Both were successful at their examinations; one commenced work in Jesselton District, the other in the Beaufort District.

School Hygiene.—In addition to Vernacular Schools and a Chinese Settlement School maintained by Government, there are a large number of State-aided Mission Schools, and several unaided Schools. In Sandakan and Jesselton school-children are examined yearly for hookworm and are treated if necessary. No other information appears under this heading though it is noted that spleen rates for children under 16 are recorded by District Medical Officers.

Public Health, Sanitation, etc.—The Staff of the Medical Department comprises a Principal Medical Officer, Dr. P. A. Dingle, five District Surgeons, European Nurse-Matrons at Sandakan and Jesselton, and a number of qualified dressers in charge of various dispensaries.

[General sanitary measures are not described in the Report under review but as the result of communication with Dr. Dingle it can be said that *Sanitary Boards* are established for the six principal centres of population and also at a number of smaller townships. As regards the disposal of *sewage*, in the capital, Sandakan, water-borne systems of drainage into septic tanks are installed at all European houses, and at a number of houses of well-to-do Chinese merchants. Public latrines with drainage to septic tanks are established in the town; among the Chinese small-holders bore-hole or pit latrines are usual, while the native population of the town, being housed over the sea, disposes of sewage by dumping into the water below. In other towns, septic tank installations are being provided where water supplies are available and adequate; public latrines are constructed over the sea; in native villages, adjacent rivers are made use of. Efforts are being made to introduce sanitary pit-latrines in rural areas.

In Sandakan *piped water supplies* after filtration and chlorination are available for all houses; standpipes are provided at different centres for those who cannot afford to pay a tap rate. In Jesselton piped supplies are laid on to all European houses, standpipes providing supplies for the remainder of the population. Two deep wells provide Kudat with water, supplies being pumped to a storage tank and thence

conducted to standpipes in the town. At Lahad Datu, river water, and at Tawau, spring water, sources are pumped to the respective towns and made available through the medium of standpipes.]

Anti-malarial measures were inaugurated in 1929 and have continued to be energetically applied since that year, streams, seepage areas and other potential breeding places of anophelines receiving the regular attention of the labour gangs employed.

Port Health Work.—Sandakan is the principal port of the State ; 56 vessels entered and 7,084 passengers and 4,779 members of crews were examined. Other ports are Jesselton, Kudat, Lahad Datu, Semporna and Tawau ; at Jesselton the 87 passengers and 111 crew of one vessel were examined, and at Tawau where 6 vessels entered, 221 passengers and 392 crew were dealt with. A quarantine station is maintained on the Island of Berhala about 3 miles from Sandakan. No infected vessel was reported during the year. Rat destruction in Sandakan port area continues regularly ; during the year 1,561 rats were destroyed, 632 were examined at the Laboratory, but none was found infected with *P. pestis*.

Hospitals, Dispensaries, etc.—The seventeen medical institutions maintained by Government include 5 Civil Hospitals and 7 Sick Rest Houses, together with Constabulary, Gaol, and Mental Hospitals, and a Leper Colony. The record of work carried out at these centres during the year reads :—

	5 Civil Hospitals	7 Sick Rest Houses	Other Institutions	Totals
Admissions	3,106	754	390	4,250
Total In-patients treated...	3,208	779	588	4,575
Hospital Deaths	205	24	30	259
Out-patients : new cases...	21,723	?	6,402	28,125
,, total treatments	49,832	?	23,454	73,286

Thirty-one Europeans were treated in the European Wards at Sandakan and Jesselton with no deaths.

At the 13 *Government Dispensaries*, each in charge of a qualified dresser, cases dealt with numbered 121,527, and the three *Travelling Dispensaries* treated 5,002 new cases during the year ; at these centres total treatments numbered 218,422.

Weekly and quarterly clinics are held at a number of centres in the State while during the extended tours of special areas made by District Surgeons from time to time, treatment clinics are held at selected villages during the course of the itineraries.

Two examinations for Hospital Dressers were held during the year ; nine dressers employed by Government and two in private employ sat, and four qualified for promotion in the Service.

The following notes briefly summarize the principal references in the Report to morbidity experience during the year under review :—

Hospital admissions for *malaria* numbered 630 and hospital deaths due to this cause 28 ; malaria was therefore responsible for approximately 15 per cent. of all hospital cases and 11 per cent. of all hospital deaths. The numbers of persons suffering from malaria and treated as out-patients at hospitals and dispensaries are not stated. It is noted that among 2,405 blood films received from Government

Hospitals and dispensaries, and examined at the Laboratory, 466 were positive for malaria parasites. Among the positive findings, *P. falciparum* infections were responsible for 33·9 per cent., *P. vivax* 53·6 per cent., *P. malariae* 6·9 per cent., and mixed infections 5·6 per cent.

On four occasions during 1936 when on tour, Dr. J. C. T. TREGARTHEN, District Surgeon, Interior Residency, recorded the following results of his examination of natives :—

Number examined	With enlarged spleens	Per cent.
(a) 1,014	633	62·4
(b) 6,039	5,883	97·4
(c) 4,125	3,820	92·6
(d) 2,312	2,280	98·6

Six cases of *blackwater fever* with one death were reported.

Beriberi was responsible for 164 hospital admissions with 12 deaths. Of the total patients admitted 38 were from Sandakan Town and 28 were Constabulary cases. As regards the former, it is pointed out that the majority were labourers from outlying logging camps who gave lodging house addresses in Sandakan on admission. The Constabulary cases were all of mild type ; on enquiry it was found that the rice issue was highly polished beriberi-producing rice if eaten without other foodstuffs producing an adequate supply of Vitamin B. A new diet scale was issued and no further cases occurred.

Cases of *dysentery* admitted to Government Hospitals numbered 227 (type of infection not differentiated but we understand this has always been found to be amoebic) and 15 deaths were ascribed to this cause. *Pulmonary tuberculosis* was the cause of 82 hospital admissions with 26 deaths, and *pneumonia* 77 cases and 30 deaths. At the laboratory 78 out of 499 specimens of sputum examined gave positive results for *Myco. tuberculosis.*

During the year 12,247 vaccinations against *smallpox* were performed with successful results in 80·5 per cent. of the cases. No case of any dangerous infectious disease was reported in the State during 1936.

Helminthiasis.—The campaign against *ankylostomiasis* inaugurated in 1921 by the Rockefeller Institute continues under the supervision of Dr. C. H. YEAGER and a special staff. All Government servants, school-children and certain classes of employed estate labourers are examined twice yearly for hookworm infection and, if necessary, given treatment. In Sandakan and Jesselton where 8,286 persons were examined the infection rate was 5·7 per cent. ; in other areas total treatments numbered 18,508. The Laboratory Report tabulates the findings among 3,664 faecal specimens examined. Among the positive findings ancylostome ova alone were present in 231 cases, ancylostome with ova of other parasites 238, ascaris alone 564, ascaris with other helminths 315, *E. histolytica* alone 303, and with other intestinal parasites 21.

Leprosy.—During the year there were 8 admissions to the *Leper Settlement,* 6 patients died, 2 absconded, and one was discharged. Seven of eight admissions were Chinese, the eighth a male Dusun.

At the end of the year 69 patients remained in the Settlement. Treatment is by weekly intramuscular injections of hydnocarpus oil with creosote. At the Laboratory among 22 nasal smears, 8 were positive, and 14 smears from nodules gave 4 positive with *Myco. leprae.*

The *Venereal Diseases Clinic* established in Sandakan in 1927 continues to function with success. *Syphilis* is said to be uncommon, but *gonorrhoea* is extremely prevalent, especially in some interior districts. During the year 22 new cases and 79 repeat cases were treated for syphilis, and 37 new cases and 119 repetitions for gonococcal infections. Urethral and vaginal smears examined at the laboratory numbered 1,675 and 195 respectively, 990 of the former and 59 of the latter being positive with the gonococcus. On three occasions when travelling in the interior Dr. Tregarthen found that 837 out of 1,254 smears examined gave positive results, *i.e.*, an infection rate of 66·7 per cent., the rates ranging in the three areas from 57·4 to 77·4 per cent. Of the 7,162 cases of *yaws* treated during the year 6,687 are recorded as new cases.

Scientific.—The Laboratory Report contains an unusual amount of detail relating to the year's work. Under such headings as *malaria, helminths, leprosy*, etc., in the preceding notes, brief mention has been made of the specimens received and examined and the principal findings recorded.

During the year under review an investigation into the native health was in progress under the direction of Dr. J. O. SHIRCORE, the terms of reference being :—

(1) Generally to study the sociological and economic conditions under which the people live, and all matters relating to the health, morbidity and mortality of the population, with special reference to mother and child.

(2) To submit a report, making at the same time recommendations calculated to promote the well-being of the Native and counteract the influence of any dysgenic at play.

A report of the results of this enquiry will be available in due course.

Financial.—Total expenditure on Medical Department Services during 1936 amounted to $161,487 as compared with $161,068 in the preceding year. *P. Granville Edge.*

UGANDA PROTECTORATE (1936).

The Uganda Protectorate lies in the northern part of the Great Lakes region of Africa. It has no sea coast, being bounded by the Anglo-Egyptian Sudan on the north, Kenya Colony on the east, Lake Victoria Nyanza and the Tanganyika Territory on the south, and the Belgian Colony on the west. The area of the Protectorate is estimated at 94,204 sq. miles, including 13,616 sq. miles of water. (The area of England without Wales is a little over 50,000 sq. miles.) The headquarters are at Entebbe and the chief commercial towns are Kampala and Jinja. All three are on or near the north shore of Lake Victoria.

Vital Statistics.—The principal data are set out in the Table on the following page.

If the registration figures are to be trusted the population of the Western and Northern Provinces is increasing more rapidly than the other Provinces.

Province	Estimated Population	Reg'd Births	Birth Rate	Reg'd Deaths	Death Rate	Infant Deaths	I.M.R.
Buganda ...	884,175	20,483	23·2	16,600	18·8	1,818	88·8
Eastern ...	1,185,368	31,510	26·6	29·689	25·1	6,298	199·9
Western ...	734,192	20,233	27·6	11,191	15·2	2,451	121·1
Northern ...	799,480	22,968	28·7	13,123	16·4	4,535	197·5
Protectorate Totals ...	3,603,215	95,194	26·4	70,603	19·6	15,102	158·6

European Officials resident numbered 570, with an average number resident of 462. One was invalided but no deaths were recorded. *Malaria* was the most common cause of illness. Among *European Non-Officials* 2,330 cases of sickness were treated by Government Medical Officers, *malaria* accounting for 452 cases, and *injuries* for 142 : deaths within this group numbered 21. *Asiatic Officials* resident numbered 367, average number resident 306, six were invalided and one died. *Malaria* was responsible for 340 cases of sickness. The Government Medical Staff treated 7,024 cases of illness among *Asiatic Non-Officials*, malaria heading the list with 2,278 cases ; 88 deaths were recorded, 26 being due to *blackwater fever*, 12 to *malaria*, and 17 to *pneumonia*.

African Officials (African Civil Service) resident numbered 178. There were no invalidings, but one death was recorded due to *pneumonic plague*.

Maternity and Child Welfare Work.—This work grows increasingly popular and the appointment of European Nursing Sisters to every district hospital in the Protectorate with the exception of four has made extensive developments possible. At the close of the year there were seven rural maternity centres under direct Government control, in addition to the numerous dispensaries and clinics undertaking ante- and post-natal welfare work without providing beds for confinement. During the year under review 16,689 women made 68,477 attendances at established centres for ante-natal supervision, 1,859 confinements were conducted at hospitals and maternity centres, and 1,732 babies were born. The maternal mortality rate for the Protectorate as a whole was 12·3 per 1,000 births, the highest rate being recorded in the Northern Province with 17·4 per 1,000 births and the lowest in the Western Province where the rate was 8·1 per 1,000 births. It is pointed out that the maternal mortality rate is raised by pregnant women who seek hospital admission as a last resort when unskilled efforts outside have failed ; in these circumstances it is not surprising to read that so many of these women die. *Midwives* on the registers at the end of the year were, European and Asiatics 69, Africans 220.

At the *Lady Coryndon Maternity Training School*, 41 students were in training, 17 sat for the certificate of the Uganda Midwives Board, and 15 were successful ; 77 midwives, six of these in training for general nursing were in service during the year. Admissions to the clinical wards of the School numbered 589, confinements 392, 310 live births and 24 maternal deaths were recorded. The Outpatient Department dealt with 3,739 expectant mothers and 869 infants brought up for post-natal supervision. No new country centres were opened owing to lack of funds, but at the 22 existing centres

records of work include 1,431 confinements, live births 1,380, infant deaths 56, maternal deaths 9, ante-natal cases 10,844, child welfare attendances 12,702 and total outpatient attendances 67,716.

The Report of the *Nsambya Maternity Training School* states that a new maternity hospital accommodating 22 patients was built during the year and improvements made to existing buildings in Nagongera and Ngora. At the Nsambya Centre 30 students were in training, five sat for and were successful at the examination of the Midwives Board. Patients admitted to the clinical wards of the Nsambya School numbered 314, confinements 237, live babies born 201, and maternal deaths 8. The 17 country centres confinements totalled 1,693, live births 1,616, infant deaths 19 and maternal deaths 21 ; there were also recorded 4,838 new ante-natal cases, 1,651 attendances at infant welfare clinics and 36,180 outpatient attendances.

School Hygiene.—Frequent visits to schools continue to be made by Medical Officers and their assistants. A frequent anomaly reported was the complete absence of sanitary accommodation for pupils, even though the teaching of hygiene figures prominently in the School curriculum. Owing to lack of funds improvement is slow, but it is reported that in the secondary schools and larger primary schools, latrines are now provided. Schools often fall short of the ordinary standards of ventilation and lighting, dormitories are overcrowded and the rooms not maintained in the state of cleanliness desirable. The elementary sanitary requirements for schools embodied in the draft School Health Regulations as finally adopted by the Advisory Council on Native Education are printed as an Appendix to the Report under review. The medical inspection of school-children was carried out in a number of districts, dental caries and trachoma being reported as particularly prevalent. Height and weight measurements of Buganda schoolboys were recorded by Dr. A. G. MACKAY of Masaka. Milk is to be issued to the school-children in Mengo District under the supervision of the Medical Officer who will record the results of this dietary experiment.

Public Health, Sanitation, etc.—The Report records a year's work resulting in slow and steady progress made. The powers provided by the Public Health Ordinance 1935 enable the authorities to frame and enforce rules for health betterment ; the consolidation and simplification of various regulations formerly in force, the new draft building, drainage, and other regulations in course of preparation are discussed at some length.

The water-borne *sewage scheme* for the commercial area of Kampala was commenced during the year, and it is hoped the work will be completed by the end of 1937. The single bucket system continues to be employed in the larger townships and is gradually being extended to smaller centres of population. At schools, factories, etc., deep pit-latrines are the usual rule. With regard to *water supplies*, the duplication of the pipe line for Kampala was commenced and Government has also approved the provision of piped supplies to Entebbe and Mbale. In rural areas sanitary inspectors continued to assist Native Authorities in the improvement and protection of local supplies.

Questions concerned with labour received special consideration. The New Rules under the Masters and Servants Ordinance were published for general information during the year, only to be met with great opposition from employers of labour, who objected to the clauses concerned with housing, diet, and hours of work. The growth

of insanitary housing conditions in trading centres and large towns complicates the problems of public health administration. The dangers of uncontrolled exploitation of land for building purposes are discussed, and steps taken to deal with these matters are described. The slum area in Jinja Township was cleared during 1936, all buildings being destroyed and the area burnt over; model dwellings in *pise-de-terre* will be erected. The standard of housing for the African is said to have improved considerably in recent years; in small townships the standard of the Asian bazaars is said still to be bad.

Legislation dealing with the control of *food supplies* and vendors of food is in course of preparation, and regulations to ensure the production of reasonably clean milk at dairies are also projected. A combined agricultural and health survey of two areas was undertaken during 1936 and the results of the investigation published under the title "The Agricultural Survey Committee Nutrition Report, No. 1—Teso."

Propaganda, etc.—The most successful Welfare Exhibition yet held in Uganda organized by the Provincial Administration with the co-operation of the Medical, Agricultural, Veterinary, and Education Departments was held at Lira in the Lango District. It is believed the lessons resulting from this exhibition will give great impetus to ordered sanitary development and improved health and efficiency not only in the district, but also in the Northern Province as a whole. The various exhibits, etc., are described in detail in the Report under review.

Training of Sanitary Personnel.—In January 1936 the Instructor of Hygiene made a commencement with the systematic training of Africans for employment as Health Orderlies or Sanitary Inspectors. The whole course will cover two years and eight months, and a high standard of knowledge and efficiency is aimed at. It is hoped to arrange for Africans thus trained to be examined by a Joint Examining Board for all East African Territories and the certificate of this Board to be recognized by the Royal Sanitary Institute. The training of Nursing Orderlies, Dispensers, etc., is discussed in the section "Uganda Medical School" below.

Hospitals, Dispensaries, etc.—During the year a comprehensive list of requirements for existing and projected hospital and dispensaries covering the next five years was prepared and submitted for Government consideration. The principal establishment changes in 1936 included the increase of nursing sisters from 20 to 25 and of Asiatic nurses from 4 to 5. The post of Asiatic Surgeon was abolished, the number of Sub-Assistant Surgeons reduced from 15 to 12 and the increase of Senior African Medical Assistants from 22 to 28.

At the end of the year there were 4 European, 9 Asiatic, and 23 African Hospitals, and in addition 93 (an increase of six) Dispensaries and Dressing Posts. The record of work carried out at these centres is shown in the Table on the following page.

Summarizing the principal items of morbidity experience during 1936 we have the following:—

Malaria.—Since 1932 the numbers of cases and deaths ascribed to this cause have progressively increased. During 1936 total cases of malaria treated at various centres numbered 71,407 and of these 31,656 [in the Hospital Returns totals read 33,607] were treated in station hospitals and 39,751 in dispensaries. The increased incidence was general throughout the Protectorate, though smallest in the

Hospitals etc.	Beds	Patients Admitted	Total Treated	Hospital Deaths	Out-patients New Cases	Out-patient Attendances
4 European	34	517	—	—	442,573	1,070,108
9 Asiatic ...	56	1,345	—	—		
23 African ...	1,273	29,215	—	—		
93 Dispensaries, etc. ...	529	?	—	—	643,997	2,024,721
Totals ...	1,892	31,077	32,165	1,833	1,086,570	3,094,829

Northern Province and highest in the Eastern Province. A great part of the increased incidence occurred among the large numbers of immigrant labourers who arrived in greatly debilitated condition, and, further, the early months of 1936 were unusually wet, with the result that there was an increase in the numbers of mosquito breeding places. Among the 33,607 in- and out-patients treated at station hospitals, 20,166 were defined as "clinical" malaria. Of the remainder, 1,269 were *benign tertian*, 1,531 *quartan*, 10,276 *subtertian*, 307 mixed infections and 58 malarial cachexia. There were 142 hospital deaths due to malaria. At the Laboratory, where 12,518 blood films were examined for parasites, 585 contained *P. malariae*, 2,941 *P. falciparum*, 65 *P. vivax*, 64 mixed infections, and 440 malaria parasites, species not identified.

Of *blackwater fever* 63 cases with 14 deaths were reported by Government Medical Officers, and 96 cases with 16 deaths by private practitioners, a total of 159 cases and 30 deaths in the Protectorate. The distribution of cases and mortality reads: European 8 cases, 2 deaths, Asians 141 cases, 26 deaths, Africans 10 cases, 2 deaths. During the past four years there have only been 40 cases among Europeans as against 539 among Asians. Among Africans appears the first recorded case in a female.

Malaria control work included drainage, filling in wells and depressions, reclamation of potential anopheline breeding places and anti-malarial swamp planting. It is stated that Africans trained in searching for mosquito larvae and adults, and capable of identifying the commoner species are now available in most towns and have assisted considerably in control measures.

Yellow Fever.—Blood samples taken from people living in the Northern Province were sent for examination to the Rockefeller Foundation Laboratory, New York; the sera of four were found to show immunity to yellow fever, and nine of these bloods also showed immune bodies to Rift Valley Fever. Five out of 22 samples of blood from forest monkeys in the same area showed protection, seven out of the eight specimens of blood from oxen showed immunity, but the blood of sheep and pigs was negative. Viscerotomes were issued to nearly all stations, but in no case did liver tissue examined show any of the changes characteristic of yellow fever (see this *Bulletin*, 1937, Supp., p. 48*). As the presence of *Aëdes aegypti* has been reported from every township of any size in the Protectorate, special efforts are directed towards the reduction of the numbers of this mosquito.

As a result of the attention which the subject of yellow fever received at the Pan-African Conference in 1935, and the subsequent visit of Dr. SOPER of the Rockefeller Foundation (see this *Bulletin*,

1937, Supp., p. 48*), the Foundation decided to send a mission to Uganda to investigate the whole position. A team of workers under the direction of Dr. A. F. MAHAFFY arrived in October, the laboratory previously occupied by the Human Trypanosomiasis Institute was placed at their disposal, and research work was to commence as soon as necessary building alterations had been completed.

Recorded cases and deaths due to *plague* were 980 with 929 deaths, as compared with 2,010 cases and 1,871 deaths in the preceding year. The whole of the Western Province was free from the disease, one district was affected in the Northern Province, two in Buganda Province, but cases occurred in every district in the Eastern Province, where 637 cases and 595 deaths were recorded. The anti-plague measures in use in Busoga (referred to in this *Bulletin*, 1937, Supp., p. 49*) appear to have been successful and their introduction to other districts is under consideration. At the Kampala laboratory the carcases of 1,570 rats were examined, 4 being found infected with *P. pestis*. The Government Entomologist reports that the investigations into the relation between plague and cotton crop were continued, results showing no evidence of the alleged correlation. Two male ferrets were imported from England for experimental use in the destruction of rats.

Cases of *relapsing fever* declined from 656 in 1935 to 493 in 1936. Of the total cases recorded 238 occurred in the Western Province, 274 were treated as hospital in-patients and 19 died. Only 2 non-fatal cases of *typhus* were reported and it appears that the universal use of the Carnie disinfestor (see this *Bulletin*, 1936, Supp., p. 47*) has proved most successful in eradicating the disease. The disease persists, however, outside the Uganda border and the importance of maintaining the apparatus in use is emphasized. A very considerable reduction in the incidence of *cerebrospinal meningitis* is noted, 360 cases with 130 deaths as compared with 1,318 cases and 469 deaths in the preceding year. The methods of individual segregation practised appear to have been at least as successful as the policy of prophylactic inoculation adopted in the Belgian Congo.

As reported in the 1935 Report an imported case of *smallpox* was discovered in Kampala during the latter part of December (see this *Bulletin* 1937, Supp., p. 49*) and in spite of wide-scale vaccination and isolation of discoverable contacts, further cases occurred among the native population. During the first three months of the year, 32 cases with 5 deaths were recorded, no case occurring after the third week in March. An intensive vaccination campaign was embarked upon, 1,223,920 vaccinations being performed and the disease stamped out.

Trypanosomiasis.—During the year under review 1,927 cases (as compared with 675 in 1935) were recorded with 58 deaths. It is believed a very large part of the increase may be attributed to the more extensive and stricter examinations carried out in the West Nile area, where 1,867 new cases were discovered. The Uganda shores of Lake Victoria are now said to be free except where the Protectorate boundary adjoins that of Kenya, and here it is impossible to determine whether the infection is kept alive by immigrants from that Colony or acquired by Uganda residents visiting Kenya—the boundary is purely artificial, and it is impossible to prevent every person from crossing from either side of the border.

As regards control measures, reclamation of lake shores from tsetse infestations is the policy actively followed; demands include the

clearing of foreshores for prescribed depths and widths sufficient to ensure complete protection from fly, the proper siting of settlements, control growth of crops, gland examination of prospective settlers, etc. It is hoped that controlled re-occupation will gradually render areas unsuitable for habitation by tsetse, though it is pointed out that reoccupation except under strict controlled conditions might prove dangerous. In the West Nile area for example, the movement of people with trypanosomiasis has resulted in the infection of a new river system believed originally clean.

In the Koich area (West Nile District) where the comparative value of attempts to eliminate fly by hand-catching or by debushing is under examination, so far the balance of evidence is in favour of debushing. The Government Entomologist reports that during the year, surveys covering a considerable portion of the Gulu district were carried out ; outstanding findings of these surveys included :—(a) the low density of *G. palpalis* in most parts of areas surveyed, (b) the wide distribution of *G. palpalis* in low concentrations *west* of a named road, with (c) the presence of *G. morsitans* in some numbers in the northern area *east* of the road, and (d) the discovery of *G. palpalis* in small numbers along a stretch of stream practically treeless but margined by tall elephant grass.

Tuberculosis was responsible for 490 cases of the pulmonary and 86 cases of other forms of the disease ; of the former 272 received treatment as hospital in-patients and 89 died, while among the remaining 86 cases, 52 were hospital in-patients and 52 died. Reported cases are fewer than in 1935, for during the year under review no dispensary records are included. At the Laboratory where 1,791 specimens of sputa were examined, 1,735 related to Africans and of these 120 proved positive with *Myco. tuberculosis*. Owing to the absence on leave of Dr. CARMICHAEL, Assistant Pathologist at the Veterinary Laboratory, no further information as to the infection of human beings with the bovine type of *Myco. tuberculosis* is available.

Pneumonia is a very fatal disease among Africans ; altogether 1,272 cases were treated, and among 1,010 in-patients 241 deaths were recorded. *Bronchitis and Broncho-pneumonia* gave rise to 10,838 cases, of which 712 received in-patient treatment and 86 died.

Government Medical Officers reported 73 cases of *enteric fever*, distributed as to 68 *Bact. typhosum*, 2 *Bact. paratyphosum B* and 3 unclassified ; all were treated as in-patients and 20 died. General Practitioners reported 7 cases, but in none of these was the type of infection defined. Altogether 2,323 cases of *dysentery* were recorded, of which 667 were amoebic, 309 bacillary and 1,347 unclassified. Of the total, 594 cases received treatment as hospital in-patients and among these 49 deaths occurred.

Helminthic Diseases.—It is stated that *ankylostomiasis* and *ascariasis* are common in every district in the Protectorate. Anti-helminthic drugs are regularly administered, but until the use of pit latrines becomes much more common, re-infections are almost certain to occur. *Taeniasis* is extremely common in the great cattle districts of the Western Province, while *dracontiasis* is confined to the Nilotic districts of the Northern Province where special efforts are being directed towards the protection of rural water supplies. Recorded cases of infestation by intestinal parasites read :—ankylostomiasis 1,940 cases, taeniasis 1,990, ascariasis 808, dracontiasis 708, and 142 cases of rectal and 27 of urinary schistosomiasis. At the Government

Laboratory where 4,934 faecal specimens were examined (of which 4,317 related to Africans), 2,327 contained ancylostome ova, 579 trichuris, 321 ascaris, 227 taenia, 7 enterobius, and 18 *S. mansoni*.

Venereal Diseases.—Cases of *syphilis* numbered 63,695, of *gonorrhoea* 14,101, and of *yaws* 62,240. The prevalence and distribution of these infections remains as previously described (see this *Bulletin* 1937, Supp., p. 50*). It is stated that though patients of both sexes seek treatment, attendance is spasmodic and rarely continued to cure.

Leprosy.—At Government Hospitals and Dispensaries 1,013 lepers attended for treatment. Results are said to have proved disappointing for patients rarely attended more than once or twice for injections. From Reports on the *Mission Leper Colonies*, the following details have been taken :—

Leper Colony	In-patients	Out-patients
Buluba : Franciscan Sisters ...	89	?
Nyenga : ,, ,, ...	150	80
Bunyoni : C.M.S.	590	?
Kuni Children's Home, Teso ...	276	3,720
Ongino	407	4,000

Among *other diseases* commented upon in the Report under review mention must be made of the following. Patients treated for *diseases of the eye* totalled 14,763 and of these 2,519 were cases of trachoma. Trachoma continues to cause grave anxiety, it is the cause of a great deal of blindness in the country and medical officers in all districts report an increase of this condition. Special attention is devoted to the disease, especially in the schools and dispensaries. *Ulcers* were responsible for 26,365 cases, one-half occurring in the West Nile area ; it is stated the numbers would have been much larger if all cases treated at the dispensaries had been included. A good deal of work has been done in testing various methods of treating tropical ulcers. Elastoplast is too expensive to be used on a large scale in native practice and the most effective dressing so far seems to be the application of camphor liniment after removal of all necrotic tissue by a magnesium sulphate powder dressing or by scraping. It is of interest to note that Dr. Forbes Brown was awarded the North Persian Forces Memorial Medal in 1936 for his paper on this disease.

Report of the Uganda Medical School, Mulago.—During the year the Joint East African Examining Board in Medicine was constituted, and held its first meeting. Syllabuses were revised and approved, regulations framed and examiners appointed. One of the most important decisions reached by the Board was to extend the period of clinical instruction from two to three years to allow for additional practical training. At the end of the year 34 students had qualified ; of these 29 are in the Protectorate service, and two in the service of the Zanzibar Government.

Text-books for the training of nursing orderlies were prepared by Dr. J. P. Mitchell, Medical Superintendent, and Miss R. A. Bagot, Lady Superintendent of Nurses. In the senior class 20 male orderlies sat for examination and 18 passed ; in the junior class 11 out of 13 were successful. The training of dispensers continues with seven students taking the course.

Scientific.—The Report of the Laboratory at Kampala announces that 46,114 examinations were carried out during the year; of the total 13,660 were blood examinations and cell counts, 4,964 were urines, 4,934 faecal examinations and 18,683 were Kahn tests. The 267 samples examined in the Chemical Section comprised specimens received from the Medical, Police, Agricultural and other Government Departments, and from Local Authorities. Many of the results of these Laboratory examinations have already been the subject of comment in preceding sections of this summary, and further reference is unnecessary. It should be pointed out, however, though it is stated that buildings, equipment, and staff are not designed for research work of elaborate type, but for the maintenance of the ordinary routine services of the Department, nevertheless, useful research work is being done. A study of the haematological characteristics of local natives was carried out by Dr. HENNESSEY, the results being published in the East African Medical Journal. A nutritional survey was carried out in Teso, and entomological surveys in Jinja and in Tororo. Scientific papers published by members of the staff include :—

HENNESSEY (R. S. F.). Haematological Observations on Natives of Uganda.—*East African Medical Journal.* Vol. 13. p. 210.

GIBBINS (E. G.). Congo Simuliidae.—*Annals of Tropical Medicine and Parasitology.* Vol. 30. p. 133.

——. Uganda Simuliidae.—*Transactions of the Royal Entomological Society.* Vol. 85. p. 217.

——. On a Melanic, Inland Race of *Anopheles costalis*, Giles (*Gambiae*) in Uganda.—*Annals of Trop. Med. and Parasitology.* Vol. 30. p. 275.

HOOPER (R. C. D.) & LOEWENTHAL (L. J. A.). A Survey of Health Work in Teso, Uganda.—*Annals of Trop. Med. and Parasitology.* Vol. 30. p. 17.

WILSON (W. A.). The Controlled Experiment in Medicine.—*East African Medical Journal.* Vol. 13. 1936. p. 164.

Financial.—Expenditure on medical services during the year under review amounted to £164,765, a sum which represents 9·6 per cent. of the total revenue of the Protectorate in the same year.

P. Granville Edge.

KENYA COLONY AND PROTECTORATE (1936).

Kenya Colony and Protectorate is in Eastern Equatorial Africa. It is bounded on the north by Abyssinia and the Sudan, on the west by Uganda, on the south by Tanganyika Territory and on the east by the Indian Ocean and Italian Somaliland. The total area is 224,960 sq. miles and is divided into nine provinces : Nyanza, Nzoia, Turkana, Rift Valley, Masai, Kikuyu, Ukamba, the Coast, and the Northern Frontier Provinces. Its capital is Nairobi and Mombasa the principal port.

Vital Statistics.—The position regarding vital registration remains unchanged (see this *Bulletin*, 1937, Supp., p. 39*) ; it is noted that " the question of the institution of a satisfactory system of registration of births and deaths has been under review by Government during the year, and the matter has also received attention from at least one Local Native Council." Dr. A. R. PATERSON comments upon the difficulties attending public health administration, etc., in the absence

of carefully recorded facts, and quotes at some length from the Introductory Note prefacing the 1936 issue of this Supplement.

For Africans the estimated population in 1936 is given as 3,186,976, for Europeans and Whites 18,192, Indians 38,653, Arabs and others 14,458, and Goans 3,577, making the total population in the Colony and Protectorate 3,261,856.

Registration is still so incomplete as to be practically worthless; available records for 1936 show :—

	Registered Births	Registered Deaths	Infant deaths
Europeans and Whites	295	144	Unmentioned
Africans and Others	48	1,500	,,
Indians	435	448	,,
Goans	107	19	,,

European Officials resident numbered 1,796 with an average number resident of 1,412. During the year 9 were invalided and 6 died. *Non-European Officials* resident totalled 2,491 and the average number resident 2,126. Among these 12 were invalided and 3 died.

Maternity and Child Welfare Work is carried out by four main agencies, *viz.*, (a) The Government Medical Department, (b) The Missionary Societies, (c) The Lady Grigg Welfare League, and (d) The Municipal Council of Nairobi, the three latter organizations receiving financial assistance from Government for the work carried out. Maternity work at various centres included the following :—

	Maternity Cases	Midwives in Training	Midwives Qualified
Government and Local Native Council Hospitals, 16 Centres ...	1,278	18	5
Lady Grigg Welfare League, 3 Centres	758	4	1
Mission Hospitals, 8 Centres ...	1,009	?	?

At Government Ante-Natal and Child Welfare Centres in Mombasa, attendances totalled 33,203 and home visits by the staff 16,317; at the Eldoret Centre attendances were 3,669 and home visits 4,410. In Nairobi this work has been the responsibility of the Municipality since 1935; during the year under review attendances numbered 37,548 and home visits 12,532.

Special note is made of the successful work accomplished in rural areas in recent years, and this is attributed to the fact that by the provision of female staff at hospital centres, the confidence of African women and their husbands was obtained. Since 1928 special maternity wards at five hospitals have been erected by Local Native Councils.

School Hygiene.—There is still no School Medical Service. In most native areas a considerable amount of work is said to be carried out by District Medical Officers and Sanitary Inspectors. At Eldoret, Indian and African schools were visited weekly. No details of these visits are supplied.

Public Health, Sanitation, etc. Dr. A. R. PATERSON reports that the maintenance and administration of the many health services in the

Colony and Protectorate was even more difficult during 1936 than in the preceding year ; demands for relief increased greatly, opportunities for constructive work were more numerous, yet financial provision to meet these was no greater, and the sanctioned strength of Medical Officers was 48 as against 50 in 1935. On the other hand it is gratifying to note that the report of practically every District Medical Officer refers to the increasing interest taken by Local Native Councils and by the people at large in public health matters. Dr. PATERSON contributes a brief historical survey of the development of public health work in Kenya from 1921 to the present time, and among other expressions of opinion emphasizes the importance of having prescribed facts regularly recorded if the progress of public health work is to be assessed with some degree of accuracy. Such facts as are available suggest there is reason to believe that on the whole the health of the people may have been better during the year under review than in 1935 ; no unusually high incidence of any of the more dangerous infectious diseases, nor of bowel or respiratory affections was recorded.

With regard to *general measures of sanitation* it is stated that the *pit-latrine campaign* continued to feature the general sanitary programme of the Department where staffs were available ; towards the end of the year the disposal of *night-soil* and *refuse* by the Indore Composting method was tried out with success in one of the smaller townships. Antimalarial control measures were maintained as usual ; in the Kusumu area special works were undertaken with the financial assistance of a grant from the Colonial Development Fund. A considerable *housing and town planning* scheme for the improvement of one of the slum areas of Nairobi was prepared and a large amount of propaganda work carried out in the native reserves. The routine inspection of *foods*, markets, dairies, etc., continued as usual. In the native reserves food supplies were better with increase in the consumption of meat. Over the country as a whole, however, dietaries are still far from satisfactory : among the agricultural tribes the use of milk is not yet appreciated and the supply of green foods inadequate and irregular. *Labour conditions* on the goldfields were on the whole satisfactory, though employers of labour are not yet prepared to embark on housing schemes involving large capital expenditure.

Medical Officers and Sanitary Inspectors devoted attention to the instruction of people in the native reserves in the elementary principles of hygiene. Health exhibits were staged at the Agricultural and Trade Shows at Nairobi and Mombasa, and similar exhibits were organized by individual Missions (and on one occasion by an African headman) in a number of native reserves.

For financial and other reasons the *training of Africans* as *dispensary health workers* was discontinued during the year.

Recommendations for future work.—The Report refers to the earlier recommendations with regard to research into the reactions to disease, etc., of the African (see this *Bulletin*, 1937, Supp., p. 40*). The importance of improving the nutritional standards of the people through the education of males in agriculture and animal husbandry, and the females in housekeeping, is emphasized. The attention of local authorities is also directed towards the importance of improving housing conditions.

Port Health Work.—Steamships entering at Kilindini or Mombasa during the year numbered 701 and dhows 1,489. A vessel from India arrived with a case diagnosed as smallpox ; no infected dhows were

recorded. The usual sanitary, etc., control services in the port area continued to function satisfactorily; 4,833 rats were trapped and 634 dissected but all with negative results for *P. pestis*. The Port Health Officer has had placed at his disposal a small room where seamen can be treated for venereal diseases; having regard to the amount of shipping activity a properly equipped clinic is desirable.

Although there are three "authorised" aerodromes in Kenya there is no aerodrome designated as a "Sanitary Aerodrome," since *permanent* and adequate facilities at existing airports for the isolation of contacts, etc., are lacking, though temporary arrangements could easily be improvised. Otherwise all the "authorised" aerodromes comply in all essentials with the requirements of the Convention. So far as aerial traffic is concerned, Kenya stands in an important position. Up to the present yellow fever has never occurred in the territory, but on the eastern seaboard the climate is hot and moist and the incidence of *Aëdes aegypti* is high. But the northern, western, and central areas of the territory are natural barriers between the eastern seaboard and the infected or suspected areas lying to the north and west of the Colony, and in view of these conditions a regulation requires all aircraft arriving from west of Long. 32·5° East, must make their first landings at either Kisumu or Nairobi where the *Aëdes* index is low; on arrival at these aerodromes aircraft are disinfected.

Hospitals, Dispensaries, etc.—Of the work in general the Report observes "Our hospitals remain full to overflowing with cases of acute disease, our dispensaries crowded with patients of whom far larger numbers than can be accommodated are clearly in need of hospital rather than dispensary treatment." Patients treated at the various institutions during the year were: *In-patients*, European 1,817, Asiatic and African 46,632; *Out-patients* European 3,609, Asiatic and African 408,788. At *Out-dispensaries* in Native Reserves 640,261 first attendances were recorded.

Mission Hospitals in receipt of grants-in-aid from Government dealt with 8,536 in-patients, 137,802 out-patients, and 80,951 dispensary patients.

The *training of Africans* as hospital assistants or male general nurses was carried on as usual at the Native Hospital, Nairobi. Twelve finished their training during the year and 21 learners were enrolled. Two of the three compounders who sat for the final examination were successful, three new entrants commenced training. It is hoped that at the proposed new native hospital at Nairobi, facilities may be provided for the systematic training of African women in general nursing.

The notes which follow summarize the principal items of morbidity experience commented upon in the Report under review.

Malaria in Kenya is endemic in all the warmer and low-lying areas, and little change appears to occur from year to year. During the year 32,882 cases were treated in hospitals or at dispensaries other than out-dispensaries, and of these 15,108 were defined as "clinical" cases, in 7,009 the type of infection was not defined. Of the remainder 707 were *benign tertian* infections, 778 *quartan*, 8,789 *subtertian*, and 480 malarial cachexia. At the Medical Research Laboratory where 14,025 blood films were examined, 1,680 were positive with *P. falciparum*, 182 *P. vivax*, 83 *P. malariae*. At the Mombasa Clinical Laboratory, among 5,446 blood specimens 4,063 gave negative results; among the positives were *P. falciparum* 1,020, *P. malariae* 53, *P. vivax* 19.

Twenty-four cases of *blackwater fever* were recorded with 5 deaths. Malaria control measures have been the subject of brief mention in the section entitled *Public Health*. In Nairobi routine observations were continued and the Medical Officer of Health kept informed of breeding activity. At Mombasa where an extensive entomological survey is in progress, *A. funestus* has not so far been found on the Island and only scanty findings of *A. gambiae*. In other areas general control work and mosquito surveys were continued.

So far as is known *yellow fever* has never occurred in Kenya, but in view of the possible introduction of the infection through the medium of aerial traffic, *Aëdes* surveys have been made in towns along the air route. The *Aëdes* index in Kisumu was found to be *nil*, Nairobi 0·19 per cent., but Mombasa is seriously infested. Effective control measures are to be introduced (see also *Port Health Work* above). Except for one imported case, *smallpox* was absent ; 15,859 vaccinations were performed during the year. At the Medical Research Laboratory 1,657,447 doses of calf lymph were prepared and 1,552,739 doses issued ; the Laboratory Report supplies Tables showing the history of each strain.

A sharp outbreak of *plague* gave rise to 139 recorded cases, the Central Province being principally affected ; it is said the true incidence of the disease was much higher than the verified cases would appear to suggest. In a number of districts steps were taken to clear and cleanse villages, and improve village grain-stores, with the result that more pasturage has become available and less cover for rats. These efforts continue.

Cerebrospinal meningitis though present in most districts throughout the year and the cause of considerable anxiety, never assumed epidemic proportions ; 319 cases were treated, 296 of these as hospital in-patients with 162 deaths. Nine non-fatal cases of *typhus* were recorded, all among Europeans, and 6 non-fatal cases of *diphtheria*.

Of *enteric fever* the Report observes " 195 cases were treated " but Hospital Returns show 209 cases with 42 deaths, the distribution of types of infection among the cases being *typhoid* 174, *paratyphoid A* 5, *paratyphoid B* 7, and undefined 23. At the Medical Research Laboratory, where 738 specimens of serum were tested for agglutinins of the enterica group, 442 gave negative results, 147 reacted positively with *Bact. typhosum*, 2 with *Bact. paratyphosum A* and 15 with *Bact. paratyphosum B*. At the Mombasa Laboratory where 140 samples were tested, 102 were negative, positive findings being *Bact. typhosum* 27, *Bact. paratyphosum A* 3, *Bact. paratyphosum B* 5.

As regards *dysentery* in the text of the Report, 2,211 cases are recorded, distributed as to 1,225 amoebic, 89 bacillary, and 897 undefined, but Hospital Returns show a total of 2,234 cases, of which 1,240 were amoebic, 91 bacillary and 903 undefined as to type of infection. At the Medical Research Laboratory where 12,948 faecal specimens were examined, 5,135 were negative ; the protozoon, *E. histolytica*, was found in 618 cases and at the Mombasa Laboratory the same organism was identified in 249 out of 3,885 specimens examined (1,179 negative). No special preventive measures were carried out for the dysenteries or enteric fevers.

Nine cases of *trypanosomiasis* were reported. The experiment of clear-riverine and lacustrine areas in South and Central Kavirondo was continued (see this *Bulletin* 1937, Supp., p. 43*). The Medical Entomologist reports the elimination of *G. palpalis* along certain

rivers and the opening up of large acreages for cotton production as a result of this work. Trapping and hand catching of tsetse continue in the Port Victoria area.

According to Hospital Returns 1,560 patients were treated for *tuberculosis*, though only 1,201 are mentioned in the text of the Report ; of the total hospital cases, in- and out-patients, 856 suffered from the *pulmonary* form of the disease. No *ad hoc* preventive measures were carried out. At the Medical Research Laboratory 134 specimens of sputum were positive with *M. tuberculosis* among 1,200 specimens examined ; the bacillus was also found in two urines and one stool, and in two out of 183 samples of cerebrospinal fluids. At the Mombasa Laboratory *M. tuberculosis* was identified in 138 out of 474 specimens of sputum examined. Patients treated for *pneumonia* in Government Hospitals numbered 3,728 and 635 hospital deaths were ascribed to this cause. The Medical Research Laboratory Report contains an account of the research work on *pneumococci* carried out during the past six years ; over this period nearly 800 strains were typed and a vaccine containing the eight most prevalent types was produced. The value of this vaccine is being tried out on cases of pneumonia in H.M. Prison, Nairobi (see also this *Bulletin*, 1936, Supp., p. 40* and 1937, Supp., p. 43*).

For *helminthic diseases* 51,029 persons received treatment ; these comprised 40,496 cases of *taeniasis*, 9,318 *ascariasis*, 1,592 *ankylostomiasis*, and 623 of *schistosomiasis*. Among the 7,813 faecal specimens giving positive findings at the Medical Research Laboratory 1,774 contained ova of *taenia*, 1,346 *ancylostomes*, 982 *ascaris*, and 256 *S. mansoni*. At the Mombasa Laboratory among 2,066 positive findings results were of different order with ova of *ancylostome* 1,383, *trichuris* 1,241, *ascaris* 879, *taenia* 488 and *S. mansoni* 91.

Five hundred and twenty-eight cases of *leprosy* received treatment during the year.

Special clinics for the treatment of *venereal diseases* are held weekly ; for men at three centres in Nairobi, and one in Mombasa, for women five centres in Mombasa and one in Nairobi. Treatment is also given at all hospitals and dispensaries. The chief difficulty at all centres is to persuade patients to continue treatment after their more distressing symptoms have been relieved. Hospital Returns show that 8,448 cases of *syphilis* were treated, 3,883 of *gonococcal infections*, *soft chancre* 133, and *granuloma venereum* 3. Medical Officers of certain districts report with concern an apparently general increase in the incidence of gonorrhoea (see also this *Bulletin* 1937, Supp., p. 43*). Persons treated for *yaws* numbered 12,258. At the Medical Research Laboratory, where the Kahn reaction is used as a routine test for syphilis, 3,625 sera were received, 1,386 gave positive and 240 doubtful reactions.

Scientific.—Dr. F. W. Vint, Senior Pathologist, contributes a comprehensive Report describing the activities of the Medical Research Laboratory. During the year 26,343 specimens of various kinds were received and dealt with ; the principal findings in many cases have already been mentioned under such headings as *malaria*, *yellow fever*, *enteric fever*, *smallpox*, *pneumonia*, etc., in these notes. Among other Research work mentioned in the Laboratory Report reference is made to the studies of basal metabolism and energy exchange in Kenya natives, which were commenced during the year, and also investigations on the subject of nutrition.

Scientific papers published by the Staff of the Section of Medical Entomology include :—

Symes (C. B.). *A. funestus* (Giles) as a " Domestic " Breeder.—*Annals Trop. Med. & Parasit.* 1936. Oct. 2. Vol. 30. No. 3.

—— & McMahon (n. P.). The Food of Tsetse Flies (*G. swynnertoni* and *G. palpalis*) as determined by the Precipitin Test.—*Bull. Ent. Res.* 1936. Dec.

—— & Vane (R. T.). The Eradication of *G. palpalis* from River Areas by the " Block " Method.—*Rec. Med. Res. Lab.* No. 7.

Roberts (J. I.).—Plague Conditions in Urban Areas in Kenya.—*Jour. Hyg.* 1936. Sept. Vol. 36. No. 1.

——. Plague Conditions in Rural Areas in Kenya.—*Jour. Hyg.* 1936. Sept. Vol. 36. No. 1.

——. The Carriage of Plague.—*Jour. Hyg.* 1936. Sept. Vol. 36. No. 1.

—— & Tonking (H. D.). Notes on an East African Vesicant Beetle, *Paederus Crebripunctatus* Epp.—*Ann. Trop. Med. and Parasit.* 1935. Vol. 29. No. 4.

A résumé of the year's work carried out at the Clinical Laboratory, Mombasa, is also contributed by Mr. W. L. Titman, the Officer in charge. Here also the principal findings have been mentioned in the preceding notes making repetition unnecessary.

Financial.—The sanctioned medical budget for 1936 amounted to £197,062, and actual expenditure £196,368, the latter approximating 5·9 per cent. of the total estimated expenditure for the Colony and Protectorate. *P. Granville Edge.*

ZANZIBAR PROTECTORATE (1936).

Zanzibar Protectorate off the East African Coast comprises the islands of Zanzibar and Pemba and the islets within their territorial waters. Zanzibar is about 53 miles long by 24 miles broad with an area of 640 sq. miles. Pemba, to the north-east of Zanzibar, is about 42 miles long by 14 miles broad. The only town of importance is Zanzibar Town.

Vital Statistics.—The estimated mid-year population, on the basis of which birth and mortality rates are computed, was said to be 242,770. During the year 3,961 *births* and 4,092 *deaths* were registered, the resulting birth and death rates being 16·3 and 16·8 per 1,000 respectively. In this connexion it should be explained that all data relating to the population, births, deaths, etc., are assembled by the Mudirs, and orwarded through the Provincial Administrations. That registration is faulty appears clear from some of the District records where birth rates range from 4·2 to 34·8 and death rates from 3·4 to 20·6 per 1,000 ; some of the figures carry little conviction. Certain vital surveys carried out in limited areas during the year, produced results rather suggestive of the fact that the population, if not reinforecd periodically by an excess of immigrants over emigrants, may be diminishing.

The *infant mortality rate,* calculated on official records is given as 90 per 1,000 live births, but it is believed that the true rate is in the neighbourhood of 200 per 1,000 live births (see this *Bulletin* 1937, Supp., p. 70*).

After commenting upon the unreliability of prevailing data the Report observes, "It has been practicable elsewhere in Africa to obtain relatively accurate statistics relating to births and deaths, and the achievement of the same standard should not be impossible in the Zanzibar Protectorate."

European Officials resident numbered 102 with an average number resident of 70. Two deaths were recorded. *Non-European officials* resident numbered 475 with an average number resident of 431. Among these 5 invalidings with no deaths were returned. The most common cause of sickness among both groups of officials were *malaria, influenza* and *diseases of the respiratory system,* and of the *skin.*

Maternity and Child Welfare Work.—The intense conservatism of the people, the lack of tribal organization, and the superstitious faith in witch doctors are among the factors combining to intensify the numerous difficulties facing the authorities in their endeavours to cultivate and develop these important branches of public health work. Yet despite all difficulties serious attempts are being made to cope with the disabilities so prevalent among women and young children in Zanzibar, and 1936 saw the first Lady Medical Officer to be appointed in the Protectorate, commence work with the assistance of a trained European Sister, a qualified Goan midwife, two African semi-trained nurses, and other subordinates. Accommodated in special quarters daily clinics for women and children were held, an ante-natal clinic held weekly, and infant welfare clinics twice weekly. All these activities are new ventures (see this *Bulletin,* 1937, Supp., p. 70*), and their immediate success so encouraging that by the end of the year plans were being considered for extending the scope of the work.

Work of the *Zanzibar Maternity Association* continued to be carried out along the lines previously described in these Summaries. During the year under review 475 women received treatment, 410 live babies were born, and 7 infant deaths were recorded. At the dispensary conducted at the *Mwembeladu Maternity Home* 7,962 cases of various kinds were treated, ante-natal attendances totalled 2,016 and post-natal 2,729.

School Hygiene.—Special attention is being devoted to the medical inspection and treatment of school-children. During 1936 the routine examination of the pupils attending 12 rural schools was carried out, when in addition to the usual physical examinations stools were examined for the ova of helminths, urines for the ova of schistosomes, blood smears were taken and examined for the presence of malaria parasites, and the Kahn test applied to the serum of each pupil. The results of these examinations are set out in some detail, but for present purposes it must suffice to say that among 701 pupils examined in Zanzibar schools, 44 per cent. of Africans and 55 per cent. of Arabs were well nourished; 74 per cent. of Arabs and 36 per cent. of Africans were described as "cleanliness good." Dental caries is common and most common among Arabs. Infection with *A. duodenale* and *ascaris* is almost universal; the number of pupils with malaria parasites in their blood is not unduly high. Twelve per cent. of Africans and 8 per cent. of Arabs reacted positively to the Kahn tests.

In the Pemba schools 370 pupils were examined. Standards of nutrition and cleanliness were not so high as in Zanzibar schools, but the results of other examinations showed no remarkable differences.

The newly appointed Lady Medical Officer examined 82 pupils in Government Girls' Schools in Zanzibar. This is the first time this

has been attempted and only the preliminaries had been completed by the end of the year, enabling a few general remarks to be made.

Hygiene is taught in all Government schools, but the results of medical inspections show that its practical application leaves much to be desired.

Public Health, Sanitation, etc.—Dr. S. W. T. Lee, Acting Director of Medical Services, contributes as an Appendix to the Annual Report an interesting account of medical progress in Zanzibar during the past 25 years.

Anti-malarial measures in Zanzibar and Pemba are now a matter of steady routine. As more funds and staff become available, control will be extended beyond the town boundaries of Zanzibar and will include various swamps and streams which are at present the breeding places of anopheline mosquitoes. In Pemba special difficulties are encountered by reason of the fact that townships are encircled by ravines and swamps, and seepages are common.

Methods of *sewage disposal* remain much the same as previously described (see this *Bulletin*, 1937, Supp., p. 72*). In the native area of Zanzibar town the odoriferous pit latrines and sullage pits are the usual feature; steady pressure is being applied to bring about improvements.

In the rural areas of both Zanzibar and Pemba a recent sanitary survey showed that only about one house in seven or eight had a latrine. Every effort is being made to emphasize the evil consequences resulting from the absence of these sanitary conveniences and to persuade the public to improve existing conditions in this respect. The responsibilities of the Medical Department include the *scavenging* and *removal of refuse* in the towns of both islands, no light task when it is observed that in Zanzibar town alone approximately 40,000 tons of refuse are dealt with each year.

With regard to *water supplies*, in Zanzibar all the Arab masonry conduits from springs supplying the town have been replaced by iron piping and except for a few wells on the town boundary, town dwellers use the piped supply, the quality of the water throughout the year being described as excellent. The Chem-Chem springs were taken into the general supply and some 3,000,000 gallons are now available daily. During the year a Paterson chlorinome was fitted at the Saateni Waterworks. In Pemba and in rural areas, sources of supply remain as previously described.

The *sanitary inspection staff* comprises one European Sanitary Supervisor and 11 Asiatic and African Sanitary Inspectors. These officials carried out their duties efficiently, but it is felt their numbers are insufficient and the addition of four sanitary inspectors has been approved.

In Zanzibar town *housing* conditions remain much the same as described in the preceding Report (see this *Bulletin*, 1937, Supp., p. 72*) except that efforts are being made to improve properties, generally in the face of determined opposition from the owners. In the native area an endeavour has been made to enforce such regulations governing hut siting as can be implemented without causing hardship, and to ensure that houses are provided with adequate ventilation, light, latrines, etc. In Pemba during the year the Medical Officer of Health assumed control of the building authority work in all townships. In the rural areas of both islands, villages usually

comprise a huddle of huts ; the chief need in rural housing lies in the provision of latrines (see above).

Food.—Rural health surveys carried out during the year leave no room for doubt that generally the population is under-nourished. Coconuts, rice, potatoes, and cassava form the basis of all African, poor Indian, and working-class Arab dietaries ; most diets are deficient in proteins and fats. The Agricultural Department are endeavouring to improve the quality of local foodstuffs grown, and are also engaged in investigating the possibilities of using large areas of country for pasturing cattle, in order that meat, milk, and animal fats may become more generally available.

Health exhibitions, lectures and demonstrations, propaganda through the medium of the Press, and distribution of pamphlets, etc., are among the practices adopted in an endeavour to spread the knowledge of hygiene and sanitation.

Courses of training for Sanitary Inspectors and Dispensers are being held and are meeting with success. Other grades, including porters, mosquito searchers, etc., are encouraged to attend night school and so merit promotion in the service.

Port Health Work.—During the year 563 ships and 582 dhows visited Zanzibar, 13,590 immigrants landed, and 13,858 immigrants embarked ; no case of infectious disease was imported, and no ships or passengers were quarantined. Aeroplane traffic is said to have assumed larger proportions during the year, but no details are supplied.

Hospitals, Dispensaries, etc.—In Zanzibar Island there are six hospitals, a leper colony and 15 sub-dispensaries ; all the hospitals are in Zanzibar town, and 13 of the sub-dispensaries in rural districts. Pemba Island has 3 hospitals in towns and 7 sub-dispensaries, and a leper colony in the rural districts. The record of work carried out at these centres (exclusive of the Mental Hospital, Leper colonies, Poor House) reads as follows :—Hospital admissions 4,413, total in-patients treated 4,961, hospital deaths 470, hospital out-patient attendances 236,128, at sub-dispensaries 223,042.

It is noted that the majority of persons attending for treatment at Government hospitals are town-dwellers, and that in remote rural areas the public rely mainly on the decoctions and enchantments of the local witch doctors. Among specific causes of sickness treated at Government centres during the year the following are selected for comment :—

Malaria patients treated at Government Hospitals totalled 7,666 and 15 hospital deaths were ascribed to this cause. The distribution of types of infection among these patients reads, 689 *benign tertian*, 31 *quartan*, 1,029 *subtertian*, 178 malarial cachexia, and 5,739 "clinical" diagnoses. At the Pathological Laboratory where 8,643 blood films were examined, 2,538 were positive for malaria parasites and distributed as to 680 *P. vivax*, 49 *P. malariae*, 1,006 *P. falciparum* and 803 undefined plasmodia—the latter classification comprising parasites which could not be assigned to a definite species accurate determination being impossible owing to the smallness of ring forms. Positive *quartan* films showed a considerable increase by comparison with 1935 experience. In Zanzibar town where 1,625 cases of malaria were recorded, the incidence of the disease has declined considerably during the past three years ; it is noted that 80 per cent. of the cases occurred among people resident on or near the town boundary, outside which very little anti-malarial work has so far been possible.

Of *blackwater fever* 17 cases were reported with 2 deaths.

Under "*Public Health*" in this Summary, brief reference has been made to malaria control measures, which continue along lines previously described (see this *Bulletin*, 1937, Supp., p. 73*). So far as preventive measures in rural areas are concerned it is stated that so far they have not proved very effective and that there is no suggestion that in Zanzibar any more than elsewhere, any practical solution of the problem is in sight. Investigations into the general malaria problems of the country are being conducted by Dr. D. D. McCarthy and his staff, and the results will be published in due course.

Plague and *cholera* formerly loomed large in the history of Zanzibar, but no cases have been recorded in recent years. No rat-proofing precautions exist but the matter has been raised by the Medical Officer of Health. Meanwhile rats are trapped regularly; during the year 21,631 rats were caught (11,254 in Zanzibar Town) and 915 spleen smears examined in the Laboratory, but no evidence of *P. pestis* was found.

Although no case of *smallpox* was reported, vaccination was speeded up during the year following news of an outbreak in Tanganyika Territory; 15,230 vaccinations were performed. Only one case of *dengue fever* and that in a European in Zanzibar Town, and none of *typhus* or *relapsing fever*.

Only 8 cases of *enteric fever* were seen at Government hospitals, but it is noted the Pathologist reports 30 positive Widals out of 89 tests. In addition to the hospital cases 22 were reported by private practitioners, the increase probably resulting from the prosecution of a private practitioner for failure to notify an infectious disease. Of *dysentery* 50 cases with 4 deaths were recorded, the distribution of types of infection being amoebic 5, bacillary 26, and 19 unclassified. All were town cases. Water carriers are a potential menace by reason of their insanitary habits and milk hawkers are a danger, but control is becoming more effective. At the laboratory cultures were made from faecal specimens in 125 cases of suspected bacillary dysentery resulting in the isolation of 19 *Bact. dysenteriae* Flexner and 4 Sonne; *E. histolytica* was isolated in 8 out of 59 specimens examined.

Tuberculosis in Zanzibar usually implies *pulmonary infection*, and during the year under review 204 of the 211 cases treated were of this form of the disease, while 49 out of 50 deaths ascribed to all forms of tuberculosis were due to phthisis. At the Walezo Tuberculosis Asylum where 94 patients were under treatment during the year, 36 died and 32 were discharged, the Report observing "there were no cases discharged cured."

Leprosy.—The abolition of the Leper Decree in 1936 and its various restrictive clauses appertaining to infected persons has been followed by the development of the two leper colonies organized and administered along lines designed to *attract* lepers, the present policy embracing in the terms of the Report, "attractive colonies, fair treatment to individuals, and no compulsion." With the abolition of the Funzi Island Settlement (see this *Bulletin*, 1937, Supp, p. 74*), an alternative colony for the use of Pemba lepers was established at Makondeni on high, well-drained ground amid ideal surroundings. It is said that these colonies are popular, new cases apply voluntarily for admission, and no cases of desertion have been recorded. Details for the year read :—

	Walezo	Makondeni	Totals
Patients admitted 1936	23	12	35
Patients under treatment	62	65	127
Discharged	1	0	1
Died	9	8	17

Although specific treatment is given in some cases, reliance is mainly placed upon good feeding, healthy surroundings, and a free life devoted to the cultivation of individual plots, whose produce can be sold.

Helminthic Diseases.—The only two of importance are *ankylostomiasis* and *schistosomiasis*. Ankylostomiasis is said to be "almost universal" in both islands and is a chief cause of disability. Every endeavour is made to bring home to the people the dangers of infection and how it can be avoided. Dispensers and sanitary inspectors in rural areas are devoting special efforts towards the installation of bore-hole latrines. Schistosomiasis is present in both islands, incidence being especially marked in Pemba. The disease is said to be tolerated by natives to a remarkable extent—infected persons think nothing of passing bloody urine for years, even though many of them may live not distant from some dispensary or hospital. During the year under review 12,608 cases of ankylostomiasis and 550 of schistosomiasis were seen. At the Laboratory among 3,966 faecal specimens examined 1,587 were positive for ancylostome ova, other findings including *trichuris* ova in 535 cases, and *ascaris* 166. Specimens of urine examined totalled 518 and of these 126 were positive findings for *S. haematobium*.

Venereal Diseases.—Cases of *syphilis* treated during the year numbered 1,200, of *gonorrhoea* and its complications 1,566, and of yaws 4,689. According to official returns gonorrhoea incidence appears to have declined steadily, but syphilis and yaws have progressively increased during the past three years. Yet the Report observes that every male adult has, or has had, gonorrhoea; local people attach little significance to the condition and do not attend for treatment unless the attack is unusually severe—in these circumstances recorded cases can scarcely indicate the actual incidence of the disease. At the Laboratory, Kahn tests totalled 3,724 and of these 834 or 22 per cent. reacted positively.

Other diseases referred to in the Report include *ulcers*: for this condition, 22,417 persons were treated, 50 per cent. of the total occurring in Pemba alone. *Bronchitis* and *broncho-pneumonia* were responsible for 6,242 cases and accounted for two-thirds of all affections of the respiratory system. The 3,566 cases treated for *diseases of the eye* included 620 cases of *trachoma*. Negligible numbers of cases of *chickenpox* and *measles* occurred but the precautions adopted were successful in preventing the spread of these diseases.

Scientific.—In the preceding notes frequent reference has been made to Laboratory examinations and their results. During the year there was a marked increase in the total number of specimens examined, the total of 21,484 including 8,643 blood films, 3,966 faecal specimens, 3,724 Kahn tests, 818 smears for the diagnosis of gonorrhoea, etc.

Financial.—Total expenditure on medical services amounted to £45,472, a sum which represents 9·6 per cent. of the total revenue of the Protectorate during 1936. *P. Granville Edge.*

REVIEWS AND NOTICES.

ALGER. **Fédération des sociétés des sciences médicales de l'Afrique du Nord. VIIe Congrès. (Alger 22, 23 et 24 mars 1937). Typhus et pseudo-typhus. Receuil des rapports, communications et conférences.** [Congress of Medical Societies of North Africa. Discussion on Typhus and Typhus-like Fevers.]—201 pp. With numerous illustrations.

This Congress under the Presidency of M. V. GILLOT, Professor of Medicine in the University of Algiers, took place in that city on March 22, 23 and 24, 1937. Delegates of the Faculties of Medicine from Paris, Bordeaux, Marseilles, Lyons, Lisle, attended; also delegates from Tunis and Morocco. Professor BRUMPT headed the Paris delegation. The opening ceremony took place in the University and was presided over by Governor General LE BEAU; the General Officer commanding the troops and the Mayor of the city were also present.

Professor GILLOT then delivered his address of welcome to the delegates and introduced the subject of discussion, namely, Typhus and Pseudotyphus. That is to say, epidemic or historic typhus and other maladies which resemble it such as Japanese River fever, Rocky Mountain fever, boutonneuse fever, etc., which are grouped under the term pseudotyphus. Immediately after the President's address the sittings of the Congress were commenced.

On the first forenoon two reports were submitted, the first by MM. GAUD and BONJEAN on the Epidemiology of historic typhus in N. Africa; the authors were of opinion that the disease had been present before the French occupation. Every year seasonal epidemics occur in Algeria in Tunis and in Morocco, the maximum being reached in February to June, according to the varying climatic conditions. The disease smoulders on between these outbreaks and in the opinion of the reporters the reservoir of the virus of true typhus is man himself.

The second report by MM. FERRARI and LIARAS was on the surgical complications of typhus; such complications are met with in severe cases and may be caused by septic infections of the mouth or eyes or of the parotid gland. Gangrene of the limbs is also met with and one case in which the entire left upper limb became gangrenous is illustrated.

In the afternoon Professor BRUMPT gave an interesting account, illustrated by numerous slides, of a "Voyage to countries where typhus occurs," and there followed a garden party at the summer palace of the Governor.

On the second day, the 23rd March, two further reports were given; MM. DONATIEN and LESTOQUARD spoke of the Rickettsia of animals, confining themselves to the parasites which affect domestic animals only and not man. Three of these have been discovered by the reporters themselves, *Rickettsia canis*, *R. ovina*, and *R. bovis*; these are transmitted by *Rhipicephalus sanguineus*, *R. bursa* and *Hyalomma*. *Rickettsia ruminantium*, the cause of heart water, is found in the endothelial cells and is carried by *Amblyomma hebraeum*; *R. conjunctivae* of sheep is a parasite of the epithelial cells and is the cause of widespread infection.

In his report on the human rickettsioses, Professor BURNET reviewed the general morphology and biology of the rickettsia and discussed

the Weil-Felix reaction and the relation of the rickettsia to *Proteus X*. He suggested the following general classification of the Rickettsial diseases :—

(*a*) The group of rickettsia of typhus transmitted by lice and fleas with 3 subgroups.

(*b*) The group of which Rocky Mountain fever is the type with São Paulo fever and boutonneuse fever.

(*c*) The group of which Japanese River fever is the type and which includes Malay scrub typhus.

Trench fever and trachoma stand by themselves.

An interesting discussion on these two papers followed and it was claimed that Tabardillo of Mexico which had been placed apart should be included in the murine typhus group and that for certain reasons boutonneuse fever should be placed in group *c* rather than in group *b*, *i.e.*, it is more closely related clinically to Japanese River fever than to Rocky Mountain fever.

In the afternoon an interesting historical account of the ancient city of Algiers and its inhabitants was given by Professors MARCAIS and Lefèvre PAUL, and the whole of the Report of the Congress is embellished by reproductions of beautiful pictures of old Algiers taken from the collection in the Museum of Antiquities.

On Wednesday, the 24th, the last reports were submitted, one by Dr. LEMAIRE on boutonneuse fever in Algeria.

The disease was first recorded here in 1927 and 27 cases have been reported up to date. Most of these cases occurred in people who were in contact with dogs infested with ticks but in some cases no such condition existed, and it is suggested that some other animals such as small rodents may also be reservoirs of the disease in Algeria. The primary sore, if found, is diagnostic, but in the author's experience this sign is not by any means constant ; the " feel " of the rash is an aid to diagnosis. The virus has been isolated and studied and it conforms to that found in cases in France.

In the discussion that followed it was suggested that in the cases where no primary sore was to be found infection may have taken place through the conjunctiva or other mucous membrane.

Professor BLANC, Director of the Pasteur Institute of Casablanca, gave a full review of the subject of vaccination against typhus and described his own methods and the good results which have followed the employment of his bile treated living vaccines.

At the last meeting of the Congress it was agreed that the next Congress should be held in 1938 in Tunis and that the subject of discussion should be " Trachoma."

The closing banquet was held on the evening of the 24th in the Hotel St. George and was attended by 150 guests.

Several excursions were made out into the desert and to the oases, some part of the way on camel back and the reporter describes this as " précédèrent l'inéluctable dislocation." *D. Harvey.*

WICKRAMASURIYA (G. A. W.) [F.R.C.P., F.R.C.S. (Edin.), M.C.O.G.]. **Malaria and Ankylostomiasis in the Pregnant Woman. Their More Serious Complications and Sequelae.**—pp. xii + 179. With 11 figs. 1937. London : Humphrey Milford, Oxford University Press. [10*s.* 6*d.*]

This essay, which shared the Katherine Bishop Harman Prize for 1936, falls into the two distinct parts which its title suggests. It

deals with the writer's experience at the De Soysa Lying-In-Home, Colombo.

The great malaria epidemic of 1934–35 provided an unexampled opportunity for study of the maternal reactions to malaria and of pregnancy, labour and the puerperium in their effect on malaria. Malaria is so prone to end pregnancy that pregnancy is no bar to its full treatment, even by quinine, which has a reputation, none too soundly based, for ending it ; on the other hand labour may bring out of latency a malarial infection. In differential diagnoses, pre-eclampsia is given special consideration in view of likeness of symptoms, hypertension being held to be the deciding factor ; here as in all sections of the book the points made are brought out by case histories ; and in the matter of foetal death they show clearly that the child may occasionally be infected *in utero*. In treatment there is again insistence on the need to use quinine with courage, plasmoquine being added, atebrin not taking its place.

Hookworm infection is a greater menace to child bearing than is malaria. Of 273 deaths in the De Soysa Lying-In-Home, 27 per cent. were due to ankylostomiasis, the next highest figure being 12·8 per cent. from puerperal sepsis. Comparing women in whom hookworm infection was discovered with those in whom it was not, certain of the grave complications discussed were 3 to 10 times commoner in the first than in the second group. Delivery, if the mother lives, means her improvement or her recovery—and her return from hospital to a place where, in present conditions, the getting of further hookworm infection is probably inevitable. The case histories in this half of the book are particularly illuminating, for in the first it is not always clear how often this infection has been added to malaria. The definition of the microphotographs of smears showing malaria parasites is disappointing and a mis-spelling of chenopodium keeps catching the eye, but the general material well deserves the usual fine setting of the Oxford University Press. *Clayton Lane.*

Zeiss (Heinz) [Prof. f. Hygiene an der Universität, Berlin] & Rodenwaldt (Ernst) [Prof. f. Hygiene an der Universität, Heidelberg]. **Einführung in die Hygiene und Seuchenlehre.** [Introduction to Hygiene and Infectious Diseases.] Second Edition enlarged.—pp. viii + 282. With 1 fig. 1937. Stuttgart : Ferdinand Enke. [Unbound, Rm. 7·60 ; Bound, Rm. 9·40.] [Review appears also in *Bulletin of Hygiene*.]

In the first part of the book, which deals with hygiene, there is some interesting information about the new public health legislation of the third Reich and prominence is given to problems of heredity, sterilization and race. Industrial diseases are also discussed fairly extensively, but very little is said about maternity and child welfare, infant mortality, hospitals, school hygiene, ventilation, heating and lighting. The authors seem to have had a good deal of tropical experience and the second part of the book, which deals with infectious diseases, is more a synopsis of tropical medicine. On the whole the book is of some interest, as it gives an insight into the present-day conception of various problems of public health in Germany. *H. Lomas.*

TRANSACTIONS OF THE CAPE COAST HISTORICAL SOCIETY. 1936. Oct. Vol. 1. No. 1. 35 pp. [5*s*.]

The tendency in the recorded history of Africa to over-emphasize incidents which Europe thinks of consequence in its relations with Africa and to ignore the many events and happenings which Africans themselves must hold to be of importance in the history of their country and their people is so marked that it is good to hear of the foundation on the Gold Coast of a local historical society which may go some way to righting the balance.

On May 30th, 1934, a few people, mindful of the great historical associations of the Gold Coast, met together at the Senior Medical Officer's Bungalow, Cape Coast, and founded "The Cape Coast Historical Society" (1) to investigate any historical matter relating to the Gold Coast, (2) to collect, preserve and publish such records of the Gold Coast as may be deemed important, (3) to establish a reference library of books, papers and manuscripts relating to the Country, and (4) finally to collate the traditional history of the Country and to reduce it to writing. By the rules of the Society, Membership is made open to anyone, irrespective of race and nationality, who can show to the satisfaction of the Committee his interest in the history of the Gold Coast, while the Committee's constitution is laid down as "a Chairman, Treasurer, and Secretary, and three ordinary members, of whom not less than two must be Africans living in Cape Coast or Elmina Districts." Thus, within the Society, the African viewpoint has been assured its due place.

The first publication of the Society here noticed was issued in October 1936, and gives the Minutes of the first meeting and a statement of the Objects and Rules of the Society, with a list of Founder Members. Then follow three papers read at the quarterly meetings of the Society. Dr. N. A. Dyce SHARP, Senior Medical Officer of the Gold Coast, and Founder and first President of the Society, fittingly begins the series with "An Historical Sketch of Cape Coast from 1610 to 1726." A paper by Mr. Justice Strother STEWART on "Anamabo, its Castle and its People" comes next, while for the third meeting Mr. B. Y. OWUSU contributes a paper on "The Rise of the United Ashanti." The end pages are given up to Correspondence and Communications, and the letters there printed well illustrate the helpfulness of the Society in obtaining for an enquirer in the Gambia some detailed information about the life of his grandfather, a Scottish merchant named William Topp, who had resided in Cape Coast over 100 years ago.

R. L. S.

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